Digital Transformation in the Financial Services Sector: New Business Models and Value Creation

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Abstract

This cumulative dissertation contributes to the field of digital transformation in the financial services sector by providing a synthesis of a set of peer-reviewed scientific articles aimed toward advancing the understanding of the value of innovation in the digital transformation of business models in the financial services sector. With this aim in mind, this dissertation focuses on three main research topics related to the field of digital transformation in financial services, whereby the first research topic addresses the digital transformation of the financial system driven by the integration of business and process innovations. To support the subsequent implementation of strategic responses based on the complexity and scope of the digital transformation required in the financial services industry, a holistic analysis of the macroeconomic and sector-specific influencing factors underlying the digital transformation in the financial services industry is presented. Furthermore, since the integration of innovations in primary or secondary business processes leads to both positive and negative consequential impacts, the ambivalent effect of the integration of digital innovations on advisory work in traditional financial institutions are further examined. The second research topic addresses the structural transformation of the financial sector inherent to the consolidation and long-term sustainability of financial technology (FinTech) companies, through the identification and empirical classification of the success factors intrinsic to the different FinTech business models. Subsequently, given that the incorporation of digital innovations into business processes not only challenges how traditional financial service providers capture and generate business value, but also how they engage with their customers to deliver value, the third research topic first explores, from a technological perspective, the digitalization of the customer interface leveraged by digital communication innovations such as chatbots, and subsequently examines the implementation of chatbots within the context of the financial industry.

Keywords: Digital Transformation, Financial Services Sector, FinTech, Business Models, Human Computer Interaction, Chatbots

Zusammenfassung

Diese kumulative Dissertation zielt darauf ab, einen Beitrag zum Bereich der digitalen Transformation im Finanzdienstleistungssektor zu leisten, indem sie eine Synthese einer Reihe von begutachteten wissenschaftlichen Artikeln liefert, die darauf abzielen, das Verständnis für den Wert von Innovationen bei der digitalen Transformation von Geschäftsmodellen im Finanzdienstleistungssektor zu fördern. Mit diesem Ziel vor Augen konzentriert sich diese Dissertation auf drei Hauptforschungsthemen im Bereich der digitalen Transformation im Finanzdienstleistungssektor. Das erste Forschungsthema befasst sich mit der digitalen Transformation des Finanzsystems, die durch die Integration von Geschäfts- und Prozessinnovationen vorangetrieben wird. Um die anschließende Umsetzung strategischer Maßnahmen zu unterstützen, die auf der Komplexität und dem Umfang der in der Finanzdienstleistungsbranche erforderlichen digitalen Transformation basieren, wird in dieser Arbeit eine ganzheitliche Analyse der branchenspezifischen Einflussfaktoren für die digitale Transformation in der Finanzdienstleistungsbranche vorgestellt. Da die Integration von Innovationen in primäre und sekundäre Geschäftsprozesse sowohl zu positiven als auch zu negativen Folgewirkungen führt, werden außerdem die ambivalenten Auswirkungen der Integration digitaler Innovationen auf die Beratungsarbeit in traditionellen Finanzinstituten näher untersucht. Das zweite Forschungsthema befasst sich mit dem strukturellen Wandel des Finanzsektors, der mit der Konsolidierung und langfristigen Nachhaltigkeit von Finanztechnologieunternehmen (FinTech) einhergeht, indem die Erfolgsfaktoren der verschiedenen FinTech-Geschäftsmodelle identifiziert und empirisch klassifiziert werden. Da die Einbindung digitaler Innovationen in die Geschäftsprozesse nicht nur die Art und Weise in Frage stellt, wie traditionelle Finanzdienstleister Geschäftswerte erfassen und generieren, sondern auch, wie sie mit ihren Kunden in Kontakt treten, um Werte zu schaffen, untersucht das dritte Forschungsthema zunächst aus technologischer Sicht die Digitalisierung der Kundenschnittstelle, die durch digitale Kommunikationsinnovationen wie Chatbots ermöglicht wird, und untersucht anschließend die Implementierung von Chatbots im Kontext der Finanzbranche.

Schlagworte: Digitale Transformation, Finanzdienstleistungssektor, FinTech, Geschäftsmodelle, Mensch-Computer-Interaktion, Chatbots

Management Summary

Digital transformation is – and will continue to be – a key challenge to all industries because almost all areas of our social and economic environments are affected by the growing trend of global digitalization, which has far-reaching consequences, even for established companies. However, the effects of the digital strategies to be implemented and the associated innovation challenges and opportunities are context- and industry-dependent.

In view of the foregoing aspects, the objective of this cumulative dissertation titled “Digital Transformation in The Financial Services Sector: New Business Models and Value Mechanisms” is to contribute to addressing the holistic shift in the value mechanisms of traditional business models in the financial services sector by analyzing the underlying conditions, implications, and challenges surrounding the introduction of digital innovations. With this objective in mind, the dissertation is structured into three main parts related to the overarching theme of digital transformation.

The first part, titled “Digital Business Transformation in Financial Services” (Chapter 3), focuses on the digital transformation of the financial system enabled by the introduction of innovations at the business and process levels. Financial service providers encounter significant challenges that affect their core business processes, especially given the high rate of change of digital transformation. The transformational focus and respective strategic changes to be implemented by companies depend on the nature of the topical challenges to be overcome at a holistic sector level. Therefore, the factors underlying the digital transformation must first be empirically identified as a baseline in which a PEST (Political, Economic, Social, and Technological) analysis conjoined with Porter’s Five Forces model is applied. As illustrated in Figure 1, the composite model approach provides a holistic and systematic overview of the influencing factors and structural challenges underlying the digital transformation of financial services, both at the macroeconomic level and in the context of the insurance and banking sectors as independent units of analysis.

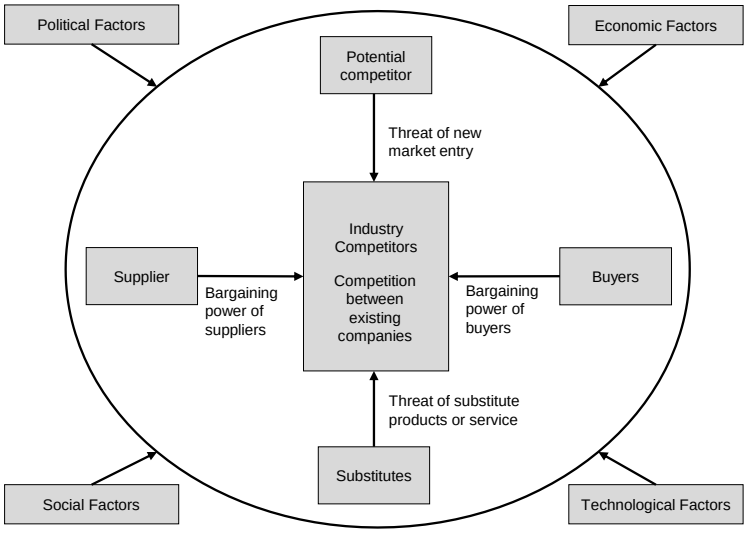


Figure 1: Representation of a combination of Porter's five forces (meso-level) and PEST analysis (macro-level) adapted from Porter (1980), Aguilar (1967) and Gupta (2013) by Werth et al. (2020, p.160)

The model results show that, despite their structural differences (e.g., in terms of liability structure and scale of operations), both the insurance and banking sectors face the same topical challenges at the macroeconomic level with different time lags. However, the speed at which the digital transformation unfolds, as well as the impact of social factors and the bargaining power of buyers, is comparatively greater in the banking sector. The significant influence of social factors related to social-cultural changes and altered consumer expectations exerts pressure on financial incumbents to incorporate new digital channels. To empower new customer-oriented digital services and interfaces, the innovative focus of financial incumbents is currently in a phase of evolutionary digital transformation that is mainly centered on upgrading and integrating front and back-office processes. This in turn potentially entails a transition in the structure of employee tasks and responsibilities within business processes. To determine the ambivalent impact of implementing front-office technological innovations on business processes in financial services, a multiple case study analysis was developed based on the Technology-Organization-Environment framework as a theoretical structure, in the form depicted in Figure 2.

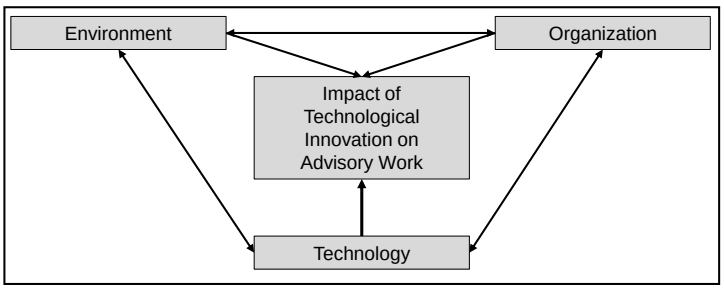


Figure 2: Technology-Organization-Environment framework based on DePietro et al. (1990) as adapted by Eden et al. (2022, p. 76)

The assessment uses advisory work as the unit of analysis and comprises two front-office digital transformation projects in this context that were implemented in two different financial services companies located in Germany. From an interpretivist perspective, semi-structured interviews were conducted with key project stakeholders to identify social constructs in the form of rationales, opinions, and lessons learned involving innovation opportunities and challenges at the technical, organizational, and environmental levels. Thereby, a set of 13 ambivalent influencing factors in the context of the implementation of technological innovations in advisory work were identified. Furthermore, a series of propositions summarizing the changes in advisory work and the implications for financial service providers in connection with the identified influencing factors are provided. The identified changes involve the need for transforming the back-office digital capabilities and innovation speed of the financial services to align with new front-end technological implementations. From a practical standpoint, the introduction of digital innovations also has a significantly ambivalent impact on the employees' perception of the visibility and control of workflow processes, which in turn challenges the internal acceptance of new technical solutions. Hence, the early involvement of internal users in the transformation process is crucial to prevent potential acceptance constraints after the restructuring of processes through digital innovations.

Part two of the dissertation, denominated "Digital Business Model Innovation in Financial Services" (Chapter 4) addresses the structural transformation within the financial sector characterized by the emergence and proliferation of new market competitors leveraging digital technologies through innovation-driven business models. These market entrants, commonly referred to as financial technology (FinTech) companies, have gradually positioned themselves across various segments of the financial services value chain. However, despite the extensive assimilation of cutting-edge technologies that characterize FinTech companies, many of them have high cash burn rates and fail to establish business models that are both successful and sustainable over the long term. Hence, for investors and FinTech founders in particular, the identification of the key value drives inherent to FinTech companies and based on their business models is of paramount importance, both in economic and strategic terms. Nonetheless, in the academic literature, the empirical knowledge concerning the success factors of FinTech companies through the lens of the business model theory is limited.

To empirically determine which business model components have the most significant impact on the success of FinTech ventures, 221 FinTech companies were examined by applying a FinTech business model taxonomy as a baseline classification framework, and using total funding as a proxy measure for the potential success of FinTech companies. Through the taxonomy, the analyzed FinTech companies were categorized along six business model dimensions and 45 characteristics after which a multiple linear regression analysis model was

developed to determine which taxonomic characteristics are significant for FinTech success. Based on this, the FinTech business model component “Product/service offering” was identified as the most influential determinant of Fintech venture success, when success is defined in terms of aggregated funding. While the results underline the fundamental relevance of product value and innovation in a unidimensional view of FinTech success, given the multidisciplinary nature of FinTech, integrative knowledge on critical success factors (CSFs) for FinTech is needed. To achieve differentiation and identification of the distinctive CSFs of the FinTech companies evaluated against those established in the scientific literature for business models in a general context, a qualitative analysis using grounded theory techniques is provided. As a basis for the analysis, semi-structured interviews with venture capitalists, as well as with chief executive officers and managers of FinTech companies, are used as the primary method for gathering qualitative data on the practitioners’ view concerning the CSFs for the survival of FinTech companies. Further, a review of the literature on business model success and venture capital investment criteria provides a joint view of the factors related to general venture success. Through an inductive analysis, 15 CSFs for FinTech companies were synthesized, nine of which are systemic, while others that are more linked with technological, regulatory, and strategic capabilities, are specific to FinTech ventures, as shown in Figure 3.

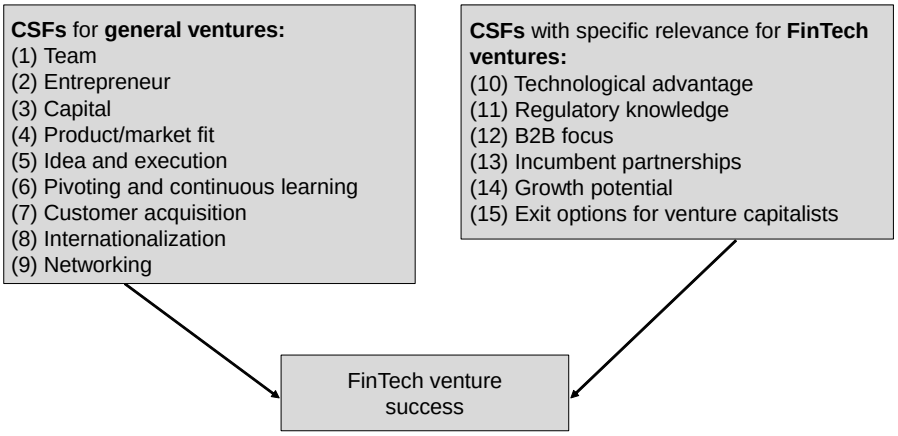


Figure 3: Critical success factors for general ventures (1-9) and with specific relevance to FinTech ventures (10-15) in line with Werth et al. (2019, p. 5)

The identified factors can be used by practitioners for benchmarking FinTech business models and dynamic competencies to reinforce the competitive position of FinTech companies in the market. However, since different FinTech segments can potentially have further idiosyncratic success factors depending on, for example, the level of market maturity, segment size, or the strength of the competition, a segment-based analysis is needed. Consequently, to determine which factors are relevant for FinTech success across diverse FinTech segments, a taxonomy-based analysis of FinTech success factors was developed. The knowledge base for the

analysis was built up on the basis of 10 lateral literature reviews related to 10 FinTech business model archetypes representing distinct segments of the FinTech industry. Figure 4 illustrates the literature review process that was applied to integrate the knowledge base for the analysis.

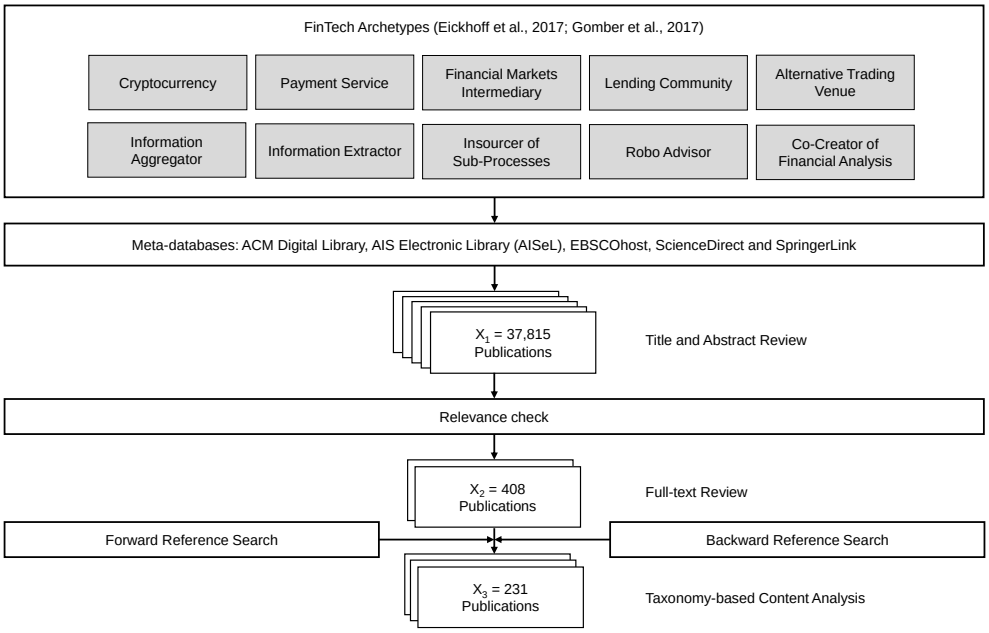


Figure 4: Literature review procedure from Werth et al. (2023, p. 5)

Through this process, a set of 231 representative scientific articles concerning FinTech success were identified that examine different unidimensional conceptualizations of success in distinct segments of the FinTech industry. The systematization of the identified scientific articles within a conceptually derived taxonomic structure resulted in the determination of 31 factors associated with FinTech success, which are listed in Table 1.

Table 1: Final taxonomic structure of the FinTech success factors of Werth et al. (2022)

Dimensions D_i	Characteristics $C_{i,j}$		
D_1 Strategic factors	$C_{1,1}$ Corporate plan	$C_{1,2}$ Operational design	
	$C_{1,3}$ Competitive plan	$C_{1,4}$ Marketing plan	
D_2 Operational factors	$C_{2,1}$ Competency-based human resources	$C_{2,2}$ Strategic networks and alliances	
	$C_{2,3}$ Operational alignment	$C_{2,4}$ Cost-benefit dynamic of the innovation	$C_{2,5}$ Efficiency
D_3 Technological factors	$C_{3,1}$ Technology integration	$C_{3,2}$ Technology adoption	
	$C_{3,3}$ Security, privacy and transparency	$C_{3,4}$ Environmental sustainability	$C_{3,5}$ Ethical issues
D_4 Value proposition	$C_{4,1}$ Convenience/ usability	$C_{4,2}$ Customization	$C_{4,3}$ Intermediation
	$C_{4,4}$ Monetary	$C_{4,5}$ Disintermediation	$C_{4,6}$ Decision support
D_5 User factors	$C_{5,1}$ User socio-economic characteristics	$C_{5,2}$ User centricity	$C_{5,3}$ User trust
	$C_{5,4}$ User-perceived quality	$C_{5,5}$ Cost attractiveness	$C_{5,6}$ Ease of use
D_6 Economic factors	$C_{6,1}$ Financial capital	$C_{6,2}$ Cost structure	
D_7 Environmental factors	$C_{7,1}$ Industry rivalry	$C_{7,2}$ Market conditions	$C_{7,3}$ Regulation

Subsequently, descriptive statistics were used to provide insights into the effect and degree of generality of the success factors that are relevant to each FinTech archetype. Through the analysis of the relative frequency distribution of the identified factors, the factors of “cost-benefit dynamic of the innovation,” “technology adoption,” “security, privacy, and transparency,” “user trust,” “user-perceived quality,” and “industry rivalry” were identified as grand challenges for the FinTech industry, in the manner depicted in Figure 5. The usefulness and applicability of the results of the taxonomy-based analysis were validated by means of expert interviews and a case-based taxonomy validation approach.

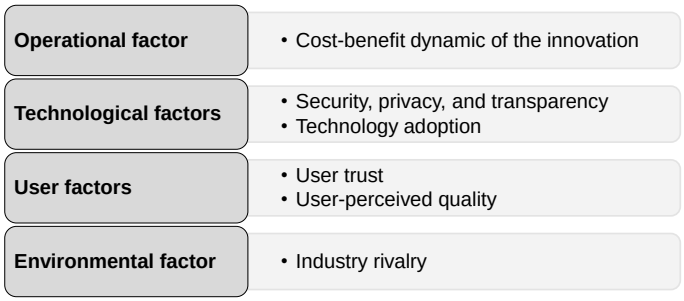


Figure 5: Grand challenges for the FinTech industry identified by Werth et al. (2023, p. 16)

The third part of the dissertation, namely “Digital Interaction and Service Innovation” (Chapter 5), addresses the overall digitalization of communication channels facilitated by digital communication innovations. Through the integration of readily available technologies, companies can digitally transform their traditional go-to-market strategies to offer omni-channel customer experiences to their customers. To accomplish this goal, companies can make use of readily available innovations in the fields of artificial intelligence and natural language processing. However, despite the potential advantages, there is still limited prescriptive knowledge to help practitioners make informed architectural decisions concerning chatbot design. To contribute to a better understanding of the diversity and complexity of the existing features for the design of domain-specific chatbots, and to show the extant implementation patterns of these design features in diverse application domains, a taxonomy of design elements for domain-specific chatbots was developed. The taxonomy is built on the basis of a review of the academic literature on the subject of chatbot design and the empirical classification of a sample of 103 real-world chatbots belonging to 23 application domains. The final taxonomic structure comprises 17 dimensions and 49 design characteristics allocated across the thematic perspectives of interaction, intelligence, and context, in the manner depicted in Table 2.

Table 2: Final taxonomy of design elements for domain-specific chatbots conforming to Janssen et al. (2020, p. 217)

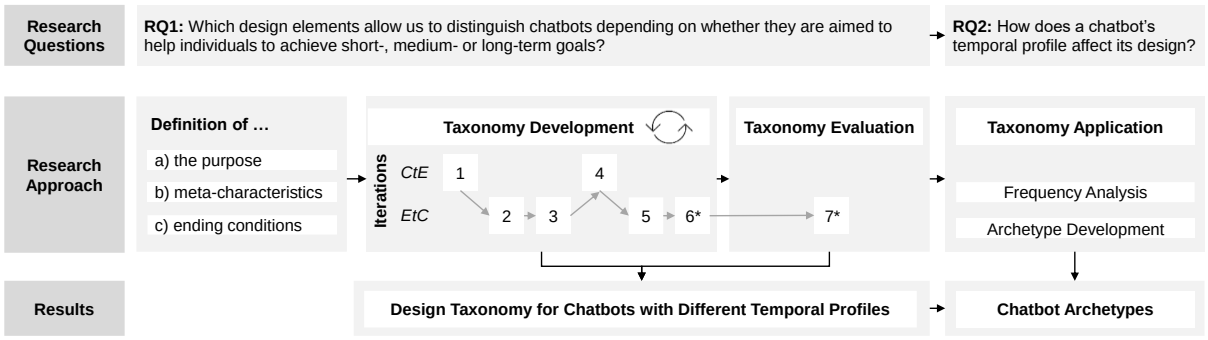
Layer 1: Perspective	Layer 2: Dimensions D_i	Layer 3: Characteristics $C_{i,j}$		
Intelligence	D_1 Intelligence framework	$C_{1,1}$ Rule-based system	$C_{1,2}$ Utility-based system	$C_{1,3}$ Model-based system
		$C_{1,4}$ Goal-based system	$C_{1,5}$ Self-learning system	
	D_2 Intelligence quotient	$C_{2,1}$ Only rule-based knowledge	$C_{2,2}$ Text understanding	$C_{2,3}$ Text understanding and further abilities
	D_3 Personality processing	$C_{3,1}$ Principal self	$C_{3,2}$ Adaptive self	
	D_4 Socio-emotional behavior	$C_{4,1}$ Not present	$C_{4,2}$ Present	
	D_5 Service integration	$C_{5,1}$ None	$C_{5,2}$ Single integration	$C_{5,3}$ Multiple integration
Interaction	D_6 Multimodality	$C_{6,1}$ Unidirectional	$C_{6,2}$ Bidirectional	
	D_7 Interaction classification	$C_{7,1}$ Graphical	$C_{7,2}$ Interactive	
	D_8 Interface personification	$C_{8,1}$ Disembodied	$C_{8,2}$ Embodied	
	D_9 User assistance design	$C_{9,1}$ Reactive assistance	$C_{9,2}$ Proactive assistance	
	D_{10} Number of participants	$C_{10,1}$ Individual human participant	$C_{10,2}$ Two or more human participants	
	D_{11} Additional human support	$C_{11,1}$ No	$C_{11,2}$ Yes	
	D_{12} Front-end user interface channel	$C_{12,1}$ App	$C_{12,2}$ Collaboration and communication tools	$C_{12,3}$ Social media
		$C_{12,4}$ Website	$C_{12,5}$ Multiple	
Context	D_{13} Chatbot role	$C_{13,1}$ Facilitator	$C_{13,2}$ Peer	$C_{13,3}$ Expert
	D_{14} Relation duration	$C_{14,1}$ Short-term relation	$C_{14,2}$ Long-term relation	
	D_{15} Application domain	$C_{15,1}$ E-customer service	$C_{15,2}$ Daily life	$C_{15,3}$ E-commerce
		$C_{15,4}$ E-learning	$C_{15,5}$ Finance	$C_{15,6}$ Work and career
	D_{16} Collaboration goal	$C_{16,1}$ Non goal-oriented	$C_{16,2}$ Goal-oriented	
	D_{17} Motivation for chatbot use	$C_{17,1}$ Productivity	$C_{17,2}$ Entertainment	
		$C_{17,3}$ Social/relational	$C_{17,4}$ Utility	

To analyze the existence of the archetypical qualities of chatbots in practice, a hierarchical clustering analysis was performed from which five chatbot archetypes were identified, namely the “goal-oriented daily chatbot,” “non-goal-oriented daily chatbot,” “utility facilitator chatbot,” “utility expert chatbot,” and “relationship-oriented chatbot”. These archetypes provide an integrated conceptualization of chatbot design elements which can be used for informing future research on this topic, as well as for the purpose of serving as a technology roadmap of chatbot design elements to facilitate the choice of alternatives in practice.

Furthermore, given that business-to-business (B2B) customers play a key role in the sales revenue of financial services providers and an increased focus on the B2B market is a CSF for FinTech companies, a chatbot taxonomy for B2B customer services was developed. The goal of the taxonomy is to offer a comprehensive view of the context-specific design elements and applications prevalent in chatbots deployed for B2B interactions. The taxonomy development procedure was achieved in four successive iterations, resulting in a taxonomy that describes 17 design dimensions and 45 design elements for B2B customer service chatbots. By analyzing 40 real-world chatbots in the B2B segment with this taxonomy, and using a hierarchical clustering algorithm, a cluster dendrogram was constructed to identify three archetypes of chatbots in B2B customer service, including a lead-generation chatbot, aftersales facilitator chatbot, and advertising FAQ chatbot. Through the integration of the theoretical and practical knowledge on the extant elements related to the structural and

functional design of B2B chatbots, this chatbot taxonomy can support traditional financial service providers and FinTech companies, as well as practitioners from other fields, to expand the reach of their digital strategies towards a B2B market focus in order to improve their market position. Furthermore, a set of 12 research directions is provided to facilitate future research in the emerging scientific body of knowledge on B2B chatbots.

Regardless of the application context for which chatbots are designed, they can be configured to accomplish different purposes and tasks that can be executed in different timespans depending on the nature and scope of the underlying motivation and goal orientation of the users to interact with conversational agents. The temporal profile of these interactions may occur within short, medium-, long-, or life-long single or multiple lengths of time, which in turn can be dependent or interdependent among them. However, in the scientific literature, there is a lack of systematic research on how the temporal component in the chatbot-user interactional relationship affects chatbot design. To close this gap, a taxonomy of design elements for chatbots with different temporal profiles was determined using a mixed-methods research approach, and a set of time-dependent chatbot design archetypes were identified. The applied research design is illustrated in Figure 6.



Note: CtE: conceptual-to-empirical; EtC: empirical-to-conceptual

Figure 6: Overview of the research design from Niessen et al. (2021, p. 3)

The taxonomy development process was executed over two conceptual-to-empirical and five empirical-to-conceptual iterations. In the first and fourth iterations, conceptually grounded taxonomic dimensions and characteristics were drawn from the review of studies concerning the prevailing design frameworks for chatbots, while in the five remaining iterations, an empirical classification of several samples of real-world chatbots was conducted. The last of these iterations was implemented as an applicability assessment of the taxonomy, whereby a total of 120 chatbots were analyzed throughout the taxonomy development and evaluation processes. The final taxonomy consists of 22 design dimensions and 61 time-dependent design characteristics. By applying the taxonomy and using inferential statistics to quantitatively evaluate distinctions among chatbots with different time horizons, three time-

dependent chatbot design archetypes were identified, namely ad-hoc supporters, temporary assistants, and persistent companions. A comparative overview of the structural design differences among the identified chatbot archetypes is presented in Figure 7. Academics and practitioners can use the taxonomy and derived archetypes as a conceptual framework for prototyping, tailoring, and evaluating chatbots with different temporal profiles.

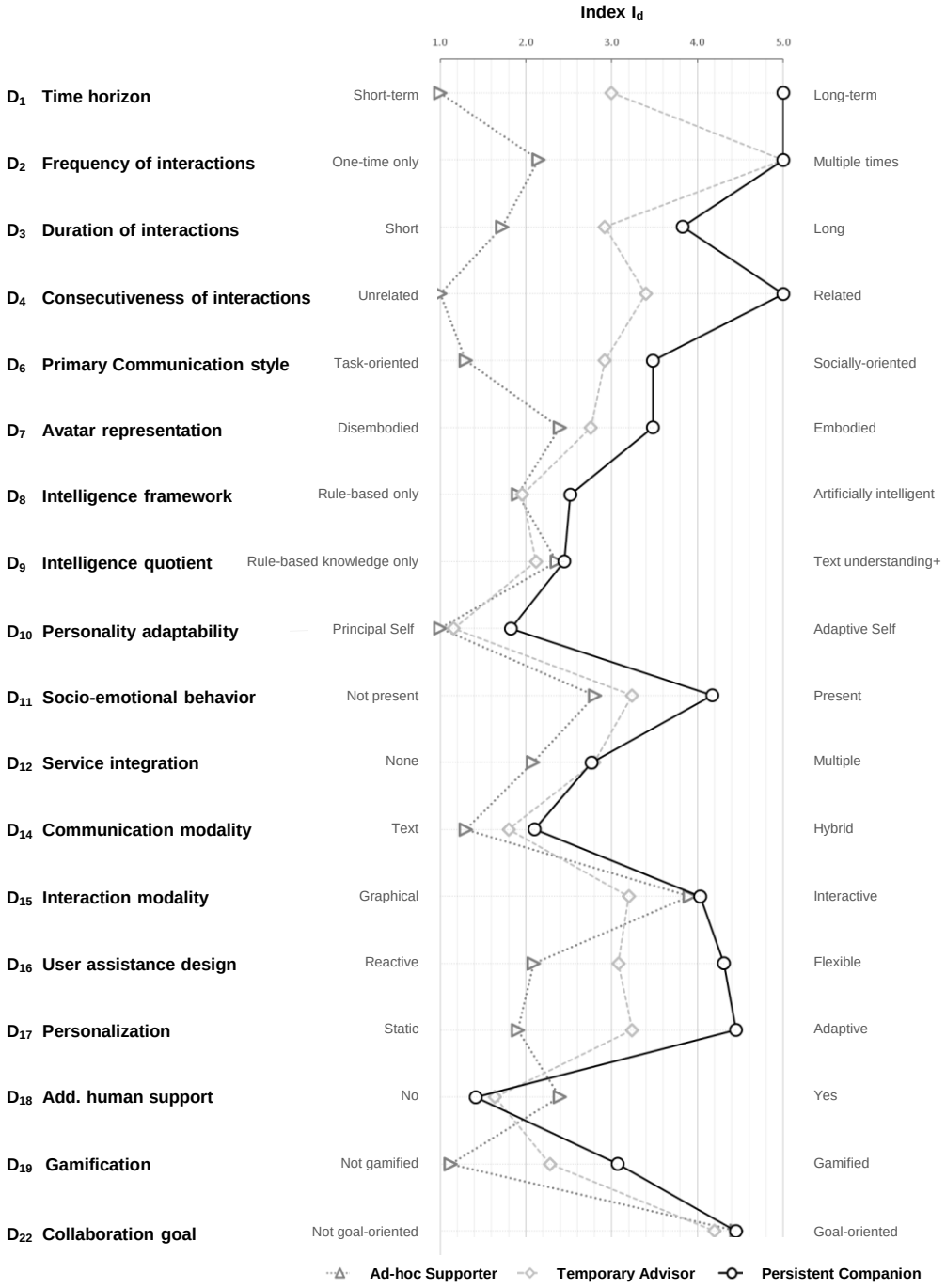


Figure 7: Design differences among time-dependent chatbot archetypes corresponding to Nissen et al. (2021, p. 7)

Conversational agents (i.e., chatbots) have gained academic and practical relevance as their presence continues to expand into a wider range of application areas. In the specific case of the financial services sector, the implementation of technological innovations in the form of chatbots could play an essential role in the transformation of the traditional multi-channel service approach into an omni-channel customer experience. This could be achieved by consolidating the advantages of the ever-accessible internet and the consultant's structural linguistic communication and knowledge base to improve efficiency across the financial services value chain with new digital interfaces. However, there is still limited scientific literature on the factors driving or hindering the adoption and diffusion of chatbot technology in a financial context. To provide socio-technical insights into the factors that positively or negatively influence the adoption and diffusion of chatbots in the financial services sector, a mixed methods analysis was performed following an interpretive paradigm. The analysis applied a sequential exploratory design using the German insurance sector as a social context and area of inquiry. In the initial phase, semi-structured expert interviews were conducted with relevant stakeholders and the compiled interview data was examined using qualitative content analysis. Subsequently, in a second conjoined quantitative phase, a cross-sectional survey targeting potential chatbot users was carried out, and the results of this survey were statistically analyzed to complement the socio-technical insights gained from the initial interviews. The approach aims to provide a convergence in the understanding of the knowledge, and affective and behavioral factors behind the different perceptions, attitudes, and beliefs that are present among industry practitioners and potential chatbot users concerning the adoption of chatbots in a financial context. One such factor, for both practitioners and potential users, is the level of trust in chatbot technology regarding the trade-off between the perceived risks and advantages.

To further examine how trust and privacy concerns – in conjunction with the perceived ease of use and usefulness – influence the intention to interact with chatbots in an insurance context, a partial least squares structural equation modeling analysis was performed. As a basis for the analysis, a conceptual model was developed and eight hypotheses were derived from the academic literature related to technology acceptance and its notional interrelationship with trust and privacy concerns. To gather empirical data for the operationalization of the theoretical constructs composing the structural equation model, a cross-sectional survey was conducted. An overview of the partial least squares results for the structural model is provided in Figure 8.

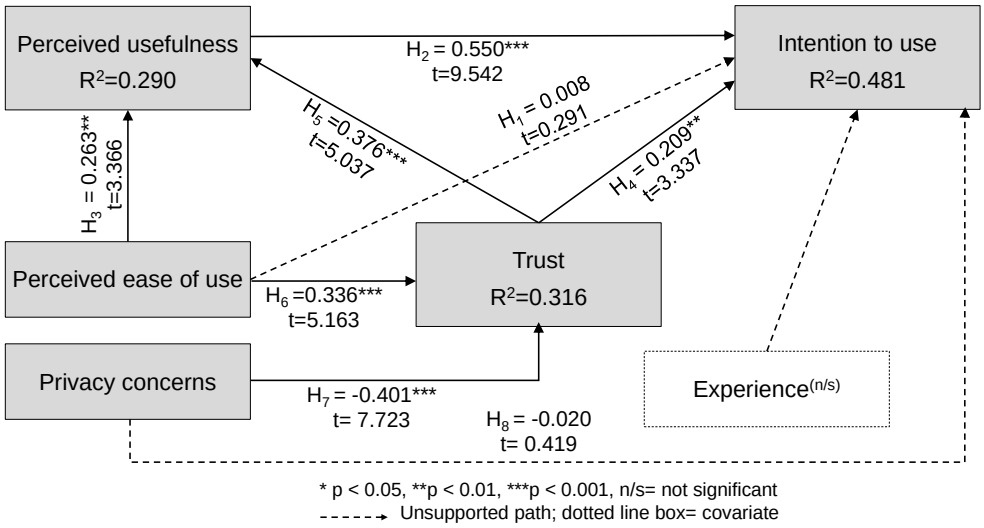


Figure 8: Conceptual model and partial least squares results from Rodríguez Cardona et al. (2021a, p. 562)

Furthermore, to assess the current level of chatbot technology diffusion in terms of the technical and functional complexity present in existing chatbots deployed for insurance settings, a sample of extant insurance chatbots was analyzed using the taxonomy of design elements for domain-specific chatbots presented at the beginning of the third part of this dissertation. Based on both analyses, a series of design implications in connection with the identified significant effects are provided. According to the partial least squares results for the structural model, perceived usefulness has a greater positive influence than perceived trust on the intention to interact with chatbots in an insurance context. In particular, this implies that chatbot design efforts should be directed at enhancing the perceived usefulness of chatbots in the eyes of the users, and must therefore prioritize the integration of chatbot design elements that add practical value to the digital experience of the user.

In view of the foregoing findings, a framework for the user-oriented design and implementation of chatbots is proposed. The research design used to develop this framework applied the design science research paradigm consistent with Vaishnavi and Kuechler (2015) in which semi-structured interviews are first conducted with experts and chatbot developers to identify the implementation conditions, relevant key issues, and the different phases comprising the implementation process of chatbots. The empirical insights obtained through the qualitative analysis of the semi-structured interviews were subsequently consolidated with further conceptual and technical knowledge from the human-computer interaction literature on user-centered design to derive the framework. To ensure the scientific rigor of the approach, the framework was evaluated through additional expert interviews, a focus group discussion, and the application of a case study. The final framework is composed of 101 user-oriented implementation questions structured in line with the previously identified implementation

phases, and the people, activity, context, and technology model of Benyon (2014; 2019), as shown in Figure 9.

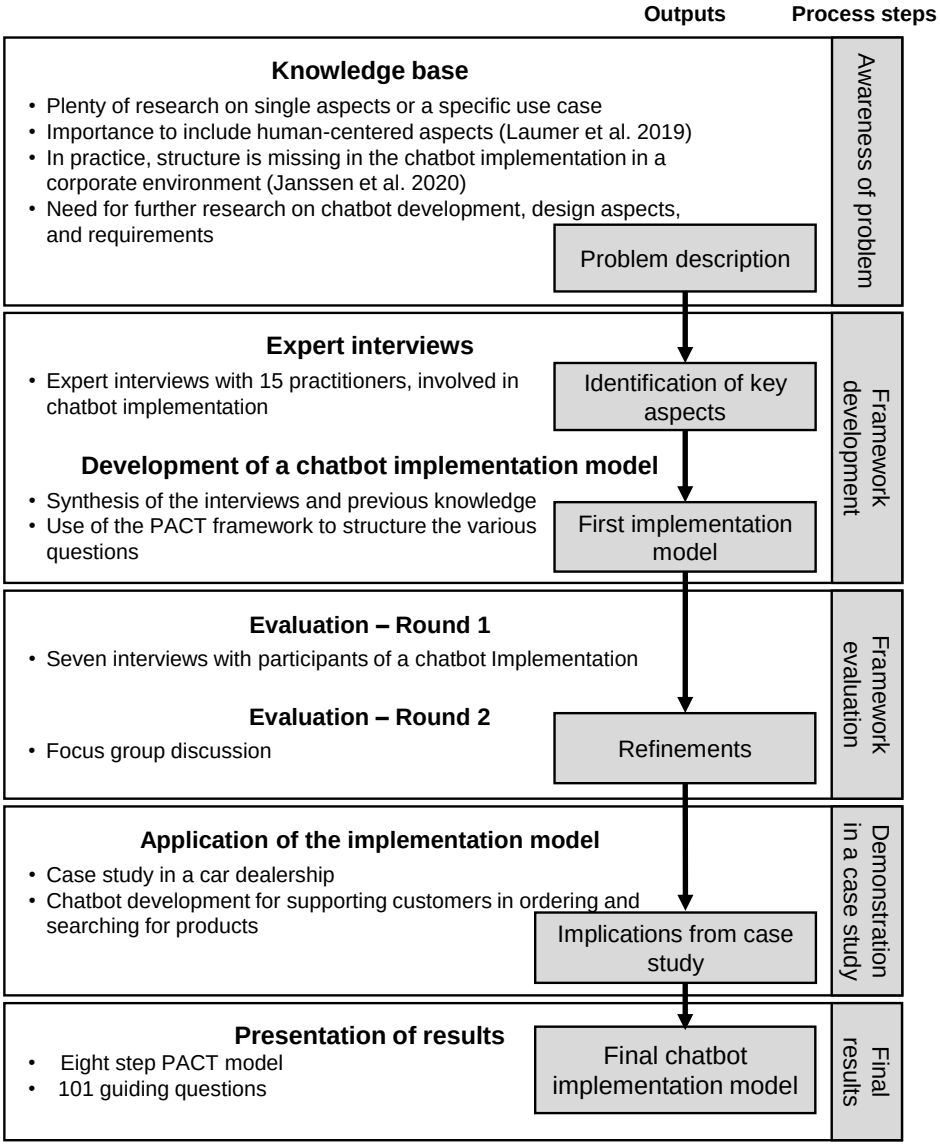


Figure 9: Representation of the research design followed by Janssen et al. (2022, p. 2)

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Symbols

R^2	Coefficient of determination
V	Cramer's V
f^2	Effect size
€	Euro
>	Greater than
≥	Greater than or equal to
H	Hypothesis
<	Less than
≤	Less than or equal to
β	Path coefficient
r	Pearson correlation coefficient
%	Percent
n	Population proportion
∑	Sum
t	T-value
χ^2	χ^2-Test

List of Abbreviations

AI	Artificial Intelligence
AMCIS	Americas Conference on Information Systems
AISeL	Association for Information Systems Electronic Library
AVE	Average Variance Extracted
B2B	Business-to-Business
B2C	Business-to-Customer
BISE	Business & Information Systems Engineering
CE	Conceptual-to-Empirical
CHB	Computers in Human Behavior
CSF(s)	Critical Success Factor(s)
DOI	Diffusion of Innovation
DSR	Design Science Research
EC	Empirical-to-Conceptual
EM	Electronic Markets
ETH Zurich	Swiss Federal Institute of Technology in Zürich (German: Eidgenössische Technische Hochschule Zürich)
FinTech	Financial Technology
FinTechs	FinTech ventures
GT	Grounded Theory
HCI	Human Computer Interaction
ICB	Insurance Chatbots
ICR	Internal Consistency Reliability
IJHCS	International Journal of Human-Computer Studies
INT_USE	Intention to Use

IS	Information Systems
IT	Information Technologies
IVBL	Institute for Risk and Insurance (German: Institut für Versicherungsbetriebslehre)
IWI	Institute for Information Systems (German: Institut für Wirtschaftsinformatik)
LNCS	Lecture Notes in Computer Science
ML	Machine Learning
MKWI	Multiconference on Business Informatics (German: ultikonferenz Wirtschaftsinformatik)
NPP GeMIDT	Lower Saxony PhD Program "Design of mobile Information Systems and Digital Transformation" (German: Niedersächsisches Promotionsprogramm)
OWL	Ostwestfalen-Lippe University of Applied Sciences and Arts (German: Technische Hochschule Ostwestfalen-Lippe)
PACT	People, Activity, Context, and Technology
PEST	Political, Economic, Social, and Technological
PLS-SEM	Partial Least Squares Structural Equation Modelling
PRIV	Privacy Concerns
PU	Perceived Usefulness
RD(s)	Research Direction(s)
RQ(s)	Research Question(s)
TAM	Technology Acceptance Model
TIE	Technology, Innovation, and Entrepreneurship
TOE	Technology, Organization, Environment
TR	Trust
TRA	Theory of Reasoned Action

URL	Uniform Resource Locator
USD	United States Dollars
UTAUT2	Unified Theory of Acceptance and Use of Technology 2
VC	Venture Capital
VCs	Venture Capitalists
VHB	German Academic Association of Business Research (German: Verband der Hochschullehrer für Betriebswirtschaft)
WWW	World Wide Web
ZVersWiss	German Journal of Risk and Insurance (German: Zeitschrift für die gesamte Versicherungswissenschaft)

Overview of Publications and Task Allocation

This section offers an overview covering 13 research publications that form the underlying foundation of this dissertation. A chronological list of these publications, along with the corresponding quality and citation indicators by publication outlet, is provided in Table 3. In particular, this cumulative dissertation focuses on 11 accepted peer-reviewed papers published between 2018 and 2023 in academic journals and conference proceedings. The publication outlets of the aforementioned articles are, in alphabetical order, the academic journals of Business & Information Systems Engineering, Computers in Human Behavior, Electronic Markets, International Journal of Human-Computer Studies, Lecture Notes in Computer Science, *Zeitschrift für die gesamte Versicherungswissenschaft*. As well as the proceedings of the Americas Conference on Information Systems, the Multiconference on Business Informatics[1], and the Hawaii International Conference on System Sciences. Additionally, two non-peer reviewed research articles have been published in the IWI Discussion Paper Series. Nonetheless, only peer-reviewed publications are further comprised in this dissertation.

These publications were done in collaboration with 23 co-authors (sorted by last name) belonging to: i) the Institute for Information Systems[2] at the Leibniz University Hannover (i.e., Prof. Dr. Michael H. Breitner, Julian Fischer, Antje Janssen, Julian Milde, Jan Nowatschin, Jens Passlick, Svenja Schönborn, Julian Uphaus, Matthias Werner, and Oliver Werth); ii) the Institute for Risk and Insurance[3] at the Leibniz University Hannover (i.e., Theresa Eden, Prof. Dr. Johann-Matthias Graf von der Schulenburg, Dr. Christoph Schwarzbach); iii) the Chair of Electronic Finance and Digital Markets at the University of Göttingen (i.e., Prof. Dr. Jan Muntermann, Matthias Palmer, Jan Roeder, Albert Torno); iv) the Ostwestfalen-Lippe University of Applied Sciences and Arts[4] (i.e., Prof. Dr. Nadine Guhr); and v) the Center for Digital Health Intervention (i.e., Prof. Dr. Tobias Kowatsch, Marcia Katharina Nißen, Driton Selimi, Prof. Dr. Florian von Wangenheim), which is a cooperation initiative of the Department

[1] German original name: Multikonferenz Wirtschaftsinformatik (MKWI)

[2] German official name: Institut für Wirtschaftsinformatik (IWI)

[3] German official name: Institut für Versicherungsbetriebslehre (IVBL)

[4] German official name: Technische Hochschule Ostwestfalen-Lippe (TH OWL)

of Management, Technology and Economics at the Swiss Federal Institute of Technology in Zürich[5] and the Institute of Technology Management at the University of St. Gallen.

The article "What Determines FinTech Success? – A Taxonomy-Based Analysis of Fintech Success Factors" (Werth et al., 2023) provides insights into the potential determinant factors for FinTech success based on a taxonomy-based analysis build around the academic literature on distinct archetypes of FinTech business models empirically validated by Eickhoff et al. (2017). In this paper, I developed the underlying idea of the research topic and approach jointly with Oliver Werth. I formulated the research problem and was the primary responsible for the structure and writing of the original draft. Together with my co-authors we abstracted the initial conceptual taxonomic structure. The data collection and content analysis were mostly carried out by me and Oliver Werth. I was mainly responsible for writing the methodological section as well as the discussion, future research directions and conclusion. The foundations, case-based validation, limitations, theoretical and practical implications were written collaboratively by the research team.

The paper "How to Make Chatbots Productive – A User-Oriented Implementation Framework" (Janssen et al., 2022) introduces a framework for user-oriented design and implementation of chatbots. In this paper, I was responsible for the qualitative analysis and coding process of the primary data collected through semi-structure expert interviews. The chatbot implementation phases, conditions and strategic actions identified through this analysis constitute the basis used for the derivation of the steps and guiding questions comprising the framework. Further, I was primary in charge of writing i) the methodological section regarding the qualitative data analysis procedure; ii) the section on the related work corresponding to the problem awareness based on related literature; as well as the results and analysis sections concerning the PACT-adapted framework steps relating to iv) preliminary considerations, v) use case determination, and vi) the definition of chatbot characteristics. Likewise, I provided additional text fragments for the chatbot implementation framework development section; the contributions and implications for research and practice section; and the conclusion. Through several feedback loops, as a group we reviewed and edited the manuscript, as well as consolidated the guiding questions of the framework.

The paper "See You Soon Again, Chatbot? A Design Taxonomy to Characterize User-Chatbot Relationships with Different Time Horizons" (Nissen et al., 2022) focuses on the time-dependent design of chatbots and proposes a taxonomy for the configuration of domain-specific text-based chatbots with different temporal profiles. In this article, I participated in the

[5] German official name: Eidgenössische Technische Hochschule Zürich (ETH Zurich)

formal analysis and data curation through the iterative test and empirical validation of the taxonomy. Furthermore, I supported the formulation of the definition of the characteristics of the final taxonomy, provided insights for the interpretation and discussion of the scientific results, and contributed to the introduction, conceptual background and limitation sections. As well, I engaged in the review and editing of the manuscript.

The paper “Influences of Digital Innovations on Advisory Work in the Financial Services Sector” (Eden et al., 2022) addresses, through a multiple case analysis, the ambivalent effect deriving from the implementation of digital innovations during the digital transformation of customer advisory services in the financial sector. In this paper, I was primary responsible for editing and improving the structure of the manuscript, as well as for writing the theoretical implications and abstract. Together with Theresa Eden, I also formulated the research propositions. Moreover, I likewise contributed to the method and data section, and concretized along with my co-authors the scientific results and the conceptualization of the discussion, practical implications, limitations and future research sections.

The paper “A Matter of Trust? Examination of Chatbot Usage in Insurance Business” (Rodríguez Cardona et al., 2021a) provides a partial least squares structural equation modelling (PLS-SEM) analysis with the aim of assessing the effect of trust, privacy concern, perceived ease of use, and perceived usefulness on the intention to use and interact with insurance chatbots. I was responsible for leading the writing process and presenting this paper at the 54th Hawaii International Conference on System Sciences, Kauai, USA (held online due to COVID-19 pandemic). I formulated the research problem and conceptualized the development of the model together with Julian Milde. The primary data was collected by Julian Milde. Prof. Dr. Nadine Guhr performed the structural equation modeling. I analyzed and interpreted the obtained results and I wrote the methodology and research design, discussion, implications, and conclusion sections. Collaboratively with Antje Jansen I wrote the foundations, hypotheses and future research sections, and with Prof. Dr. Nadine Guhr the data analysis and results section.

The paper “More than FAQ! Chatbot Taxonomy for Business-to-Business Customer Services” (Janssen et al., 2021a) presents an integrated view of the design elements prevalent in B2B chatbots through the development of a chatbot taxonomy for B2B customer services. This scientific paper received the “Best Paper Award” at the 4th International Workshop on Chatbot Research and Design (CONVERSATIONS 2020), Amsterdam, The Netherlands (virtual event due to COVID-19 pandemic). In this work, I participated in the conceptualization, methodological classification and iterative development of the taxonomy, and wrote the research design, methodology and results. In addition, I formulated the conceptual definition

of the dimensions and characteristics of the proposed taxonomy and developed the visual representations of the final taxonomy and the distribution of the taxonomic characteristics. I also contributed to the discussion, implications, recommendations, limitations and further research section, as well as to the revision and editing the manuscript.

The paper “The Role of User Involvement: Relationship between Participatory Design and Design Science Research” (Janssen et al., 2021b) offers a comparative analysis of the diverse participatory design methods applied in the existing scientific literature, either independently or integrated within design science research (DSR) approaches. My role in this paper was to write the abstract and introduction sections and contributing to reviewing and editing the manuscript. Since only peer-reviewed publications are incorporated into this cumulative dissertation, this publication is not further considered in the context of this dissertation.

The paper “Virtual Assistance in any Context: A Taxonomy of Design Elements for Domain-Specific Chatbots” (Janssen et al., 2020) provides a taxonomy of design elements for domain-specific chatbots as a structural basis for differentiating and categorizing them according to archetypical design elements. In this work, I had an extensive participation in several key components of the article. I was primary responsible for writing the research approach, including the taxonomy development and the iterative classification process; the conclusion, and the most part of the discussion section. Besides, I formulated the research gap in addition to the rationale underlying the selection of the perspectives used as central axes for the development of the taxonomy structure. Likewise, I wrote the definition of the term used as working meta-characteristic of the taxonomy (i.e., “design elements”) and formulated the conceptual definition of the dimensions and characteristics of the final taxonomy. These definitions were subsequently critically reviewed within the team and in the focus group discussions, and I implemented the respective changes independently (except for the dimension related to the intelligence framework, whose final formulation was produced in conjunction with Antje Janssen). Moreover, as part of the methodological work, I participated in the data curation and formal analysis. In this regard, I and Antje Janssen collaboratively reviewed the scientific literature and extracted an initial collection of dimension and characteristics. After that, I participated together with my co-authors in the empirical analysis and methodical classification process underlying the development of the taxonomy. I also contributed to the evaluation of the taxonomy by planning and carrying out on my own the first focus group discussion with academics, and by co-conducting with Antje Janssen the second focus group. In addition, I developed the visual representations of the final taxonomy and the distribution of characteristics per perspective.

The paper “Influencing Factors for the Digital Transformation in the Financial Services Sector” (Werth et al., 2020) applies a PEST (Political, Economic, Social, and Technological) analysis coupled with a Porter's Five Forces model with a view to determining the driving factors underlying the digital transformation. In this article, I developed the analysis of the literature and wrote the sections of the manuscript regarding the related literature and the theoretical background referent to the digital transformation in the financial services sector.

The discussion paper “User Acceptance of Robo-Advisor Systems for Digital Investment Management in Germany” (Rodríguez Cardona et al., 2020) introduces a conceptual structure model aimed at assessing the underlying factors determining the acceptance of robo-advisor systems in Germany. Together with Julian Uphaus and Julian Fischer, I defined the research problem and conceptualized the model. Julian Uphaus and Julian Fischer concluded the primary data collection, formal analysis and visualizations. I was primary responsible for structuring, editing and writing the manuscript, with the exception of the introduction, which was written by Antje Janssen. This publication is not further regarded within this dissertation.

The paper “A Mixed Methods Analysis of the Adoption and Diffusion of Chatbot Technology in the German Insurance Sector” (Rodríguez Cardona et al., 2019) provides insights into the socio-technical factors underlying the dissemination and implementation of chatbots in the German insurance sector using multiple theoretical models for acceptance and diffusion research as a theoretical axes. I formulated the research problem together with Svenja Schönborn, who subsequently collected the relevant primary data and provided insights for the methodology and results section. I was responsible for administrating the research project, structuring and writing the original draft, as well as presenting this paper at Americas Conference on Information Systems 2019 in Cancún, Mexico. At the same conference, the paper “Challenges of the Financial Industry - An Analysis of Critical Success Factors for FinTechs” (Werth et al., 2019) was also presented. This paper addresses the differences and parallels existing between the critical success factors (CSFs) for FinTech companies and those for ventures in general through a qualitative analysis using grounded theory (GT) techniques. In this work I supported the revision and edition process and assisted the preparation of the manuscript by providing general insights and recommendations for improvement.

The paper “Make or Break: Business Model Determinants of FinTech Venture Success” (Roeder et al., 2018) was presented at the Multiconference on Business Informatics 2018 in Lüneburg, Germany. The paper offers an empirical analysis on the impact of diverse business model components on the success of FinTech companies. In this article, I formulated the research gap, and I was primary responsible for writing the foundations of the paper. I also contributed to the analysis, and results and implications sections.

Table 3: Overview of publications

Year	Title	Authors	Outlet	WKWI [1]	JQ3 [2]	IF [3]	Chapter	Appendix
2023	What Determines FinTech Success? A Taxonomy-Based Analysis of FinTech Success Factors	O. Werth, D. Rodríguez Cardona, A. Torno, M.H. Breitner, J. Muntermann	Electronic Markets (EM)	A	B	4.765	Chapter 4	Appendix L
2022	How to Make Chatbots Productive – A User-Oriented Implementation Framework	A. Janssen, D. Rodríguez Cardona, J. Passlick, M.H. Breitner	International Journal of Human-Computer Studies (IJHCS)	B	-	3.632	Chapter 5	Appendix M
2022	See You Soon Again, Chatbot? A Design Taxonomy to Characterize User-Chatbot Relationships with Different Time Horizons	M.K. Nissen, D. Selimi, A. Janssen, D. Rodríguez Cardona, M.H. Breitner, T. Kowatsch, and F. von Wangenheim	Computers in Human Behavior (CHB)	-	-	6.829	Chapter 5	Appendix J
2022	Influences of Digital Innovations on Advisory Work in the Financial Services Sector	Theresa Eden, O. Werth, D. Rodríguez Cardona, C. Schwarzbach, M.H. Breitner, J.-M. Graf von der Schulenburg	Die Unternehmung: Swiss Journal of Business Research and Practice	-	C	-	Chapter 3	Appendix K
2021	A Matter of Trust? Examination of Chatbot Usage in Insurance Business	D. Rodríguez Cardona, A. Janssen, N. Guhr, M.H. Breitner, and J. Milde	Proceedings of the 54th Hawaii International Conference on System Sciences (HICSS), Kauai, USA.	B	C	-	Chapter 5	Appendix G
2021	More than FAQ! Chatbot Taxonomy for Business-to-Business Customer Services	A. Janssen, D. Rodríguez Cardona, and M.H. Breitner	Lecture Notes in Computer Science (LNCS)	B	C	-	Chapter 5	Appendix H
2021	The Role of User Involvement: Relationship between Participatory Design and Design Science Research	A. Janssen, D. Rodríguez Cardona, and M.H. Breitner	IWI Discussion Paper Series	-	-	-	-	Appendix I
2020	Virtual Assistance in any Context: A Taxonomy of Design Elements for Domain-Specific Chatbots	A. Janssen, J. Passlick, D. Rodríguez Cardona, and M.H. Breitner	Business & Information Systems Engineering (BISE)	A	B	4.532	Chapter 5	Appendix D
2020	Influencing Factors for the Digital Transformation in the Financial Services Sector	O. Werth, C. Schwarzbach, D. Rodríguez Cardona, M.H. Breitner, and J.-M. Graf von der Schulenburg	Zeitschrift für die gesamte Versicherungswissenschaft (ZVersWiss)	-	C	-	Chapter 3	Appendix E
2020	User Acceptance of Robo-Advisor Systems for Digital Investment Management in Germany [3]	D. Rodríguez Cardona, A. Janssen, J. Uphaus, J. Fischer, and M.H. Breitner	IWI Discussion Paper Series	-	-	-	-	Appendix F
2019	A Mixed Methods Analysis of the Adoption and Diffusion of Chatbot Technology in the German Insurance Sector	D. Rodríguez Cardona, O. Werth, S. Schönborn, and M.H. Breitner	Proceedings of the 25th Americas Conference on Information Systems (AMCIS), Cancun, Mexico	B	D	-	Chapter 5	Appendix B
2019	Challenges of the Financial Industry - An Analysis of Critical Success Factors for FinTechs	O. Werth, D. Rodríguez Cardona, J. Nowatschin, M. Werner, N. Guhr, and M.H. Breitner	Proceedings of the 25th Americas Conference on Information Systems (AMCIS), Cancun, Mexico	B	D	-	Chapter 4	Appendix C
2018	Make or Break: Business Model Determinants of FinTech Venture Success	J. Roeder, D. Rodríguez Cardona, M. Palmer, O.Werth, J. Muntermann, and M.H. Breitner	Proceedings of the Multikonferenz Wirtschaftsinformatik 2018 (MKWI), Lüneburg, Germany	C	D	-	Chapter 4	Appendix A

[1] Wissenschaftliche Kommission für Wirtschaftsinformatik 2008 WI-Orientierungslisten (Heinzl et al., 2008)
[2] JOURQUAL3 Verband der Hochschullehrer für Betriebswirtschaft (Hennig-Thurau et al., 2015)
[3] 2020 Journal Impact Factor (Clarivate Analytics, 2021)
[4] Nutzerakzeptanz von Robo-Advisor Systemen für das digitale Investitionsmanagement in Deutschland

1 Introduction

1.1 Motivation, Problem Definition and Research Questions

The financial services sector is a backbone segment of any economy that holds a fundamental economic, social, and strategic importance, particularly given the major role it plays in financing the real economy and driving economic growth (Schmidt, 2018; Purewal & Haini, 2022). However, in recent years, traditional financial services entities such as incumbent banks and insurance companies are increasingly being challenged by multiple underlying sources of business pressures (Werth et al., 2020; Eden et al., 2022). These are manifested in the form of new market dynamics in the business environment of the financial services sector and are mainly derived from the rapid diffusion of "information, computing, communication, and connectivity technologies" (Sebastian et al., 2017, p. 197; Schuelke-Leech, 2018). As a result of the ongoing dissemination of novel technical possibilities and the intensification of the mainstream use of internet-based devices and platforms, the levels of digitalization of society and everyday life have grown progressively, which in turn leads to changes in customer expectations and requirements (Nadkarni & Prügl, 2021; Van Veldhoven & Vanthienen, 2022). Drawn by the market opportunities opened up by an increasingly digitalized world, innovative born-digital market entrants – commonly known as financial technology (FinTech) companies – using disruptive business models and product-service offerings leveraged by digital technologies have emerged in the financial services sector (Eickhoff et al., 2017). To maintain a strong market position within a higher competitive and dynamic business environment, incumbent companies are thus compelled to undertake a process of deep strategic transformation (Drechsler et al., 2020). Such pressure for change has been further intensified by the economic and social challenges posed by the COVID-19 pandemic (Wade & Shan, 2020; Amankwah-Amoah et al., 2021).

The inexorable strategic transformation involves optimizing and redesigning primary and secondary business processes and workflows through the implementation of digital transformation strategies and the systematic integration of digital innovations (Greineder et al., 2020; Diener & Špacek, 2021). However, both the impact of the digital strategies to be undertaken and their underlying innovation demands and opportunities differ across contexts and industries (Kraus et al., 2022). Hence, to understand the nature of the sector-specific structural challenges that must be addressed and their underlying connections, there is a need for academic research providing a holistic perspective on the internal and external challenges, opportunities, and impacts of digital transformation across different sectors (Reis et al., 2018; Kraus et al., 2022).

The incorporation of digital innovations within business processes has a transformational impact on the intrinsic value mechanisms that frame the conceptualization of traditional business models. In the case of the financial sector, this disruptive transformation not only challenges how traditional financial service providers capture and generate business value but also how they engage with their customers to deliver such value (Riasanow et al., 2018; Naimi-Sadigh et al., 2021). However, particularly traditional sectors such as the financial industry experience difficulties during the development and implementation of digital approaches, which is an issue that has not comprehensively been addressed in the current scientific literature to date (Nadkarni et al., 2020; Diener & Špacek, 2021).

The research conducted for this cumulative dissertation was grouped into the main thematic topics of “Digital Business Transformation in Financial Services,” “Digital Business Model Innovation in Financial Services,” and “Digital Interaction and Service Innovation”. Across these, several socio-technical aspects concerning digital transformation were systematically analyzed using qualitative and quantitative research methods. An overview of the research questions (RQs) addressed in this dissertation is presented in Table 4. The cumulative analysis highlights the opportunities, implications, and challenges in these areas together with possible solutions for addressing them and new research directions (RDs) in the field.

Table 4: Overview of the research questions or research objectives by publication

Chapter	Research Title	Research Question(s)/ Research Objective
Chapter 3: Digital business transformation in financial services	Influencing factors for the digital transformation in the financial services sector.	Identification of the factors influencing the digital transformation at the macroeconomic level and with a sector-specific view using the insurance sector and the banking sector as independent units of analysis.
	Influences of digital innovations on advisory work in the financial services sector	"How are digital innovations influencing advisory work in the financial services sector, and what implications can be drawn?"
Chapter 4: Digital business model innovation in financial services	Make or break: Business model determinants of FinTech venture success	"Which components of a FinTech company's business model have the highest impact on venture success?"
	Challenges of the financial industry - An analysis of critical success factors for FinTechs	"What are the distinctive critical success factors for FinTechs and general ventures?"
	What determines FinTech success? A taxonomy-based analysis of FinTech success factors	"Which theoretically grounded factors are potentially relevant for FinTech venture success across distinct FinTech archetypes and business model dimensions?"
Chapter 5: Digital interaction and service innovation	Virtual assistance in any context: A taxonomy of design elements for domain-specific chatbots	"What are conceptually grounded and empirically validated design elements for domain-specific chatbots?" "Which chatbot archetypes can be empirically identified across diverse application domains?"
	More than FAQ! Chatbot taxonomy for business-to-business customer services	"Which conceptually grounded and empirically validated design elements for B2B customer service chatbots exist? Which archetypes can be empirically deduced for B2B customer service chatbots?"
	See you soon again, chatbot? A design taxonomy to characterize user-chatbot relationships with different time horizons	"Which design elements allow us to distinguish chatbots depending on whether they are aimed to help individuals to achieve short-, medium- or long-term goals?" "How does a chatbot's temporal profile affect its design?"
	A mixed methods analysis of the adoption and diffusion of chatbot technology in the German insurance sector	"Which socio-technical factors influence (positively or negatively) the adoption and diffusion of chatbot technology in the insurance sector?"
	A matter of trust? Examination of chatbot usage in insurance business	"How trust, privacy concerns, perceived ease of use, and perceived usefulness effect the intention to interact with insurance chatbots?"
	How to make chatbots productive - A user-oriented implementation framework	"What questions need to be considered in a user-oriented chatbot implementation and how can these questions be structured in an implementation framework?"

1.2 Structure of the Dissertation

This cumulative dissertation is structured into seven chapters in connection with the overarching topic of digital transformation, as shown in Figure 10. Chapter 0 comprises the front matter including the preface, which consists of the acknowledgments page, the abstract, and a management summary providing a general description of the main aspects and thematic correlation of the publications underlying the dissertation. Additionally, it provides preliminary elements to frame the dissertation, such as the table of contents and the lists of figures, tables, symbols, and abbreviations used in the main text. Finally, a brief overview of each publication is provided, together with a description of the allocation of tasks and responsibilities assumed by the author of this dissertation in each publication. Following this, Chapter 1 introduces the motivation, problem definition, RQs, and structure inherent to this work. Subsequently, Chapter 2 provides relevant theoretical background concerning digital transformation in the financial industry to contextualize the research conducted in the existing academic knowledge while

Chapters 3, 4, and 5 constitute the main body of the dissertation. Chapter 3 approaches the underlying factors, implications, and challenges surrounding the digital transformation of the financial services sector from a holistic perspective and examines the drivers and ambivalent impact of the integration of digital innovations and transformation strategies across determined primary and secondary business processes of the financial services sector. Chapter 4 focuses on the structural transformation of the financial sector that is intrinsically linked to the entry, consolidation, and long-term sustainability of FinTech companies based on innovative business models. Applying a technological perspective, Chapter 5 approaches the digitalization of interaction channels leveraged by digital communication innovations such as chatbots, and further addresses the implementation of these in the financial industry. In the subsequent Chapter 6, the overall insights are discussed, after which the implications, generalization, and limitations of the work are presented before further RDs are outlined. Finally, the dissertation concludes with Chapter 7, in which an overall conclusion is provided.

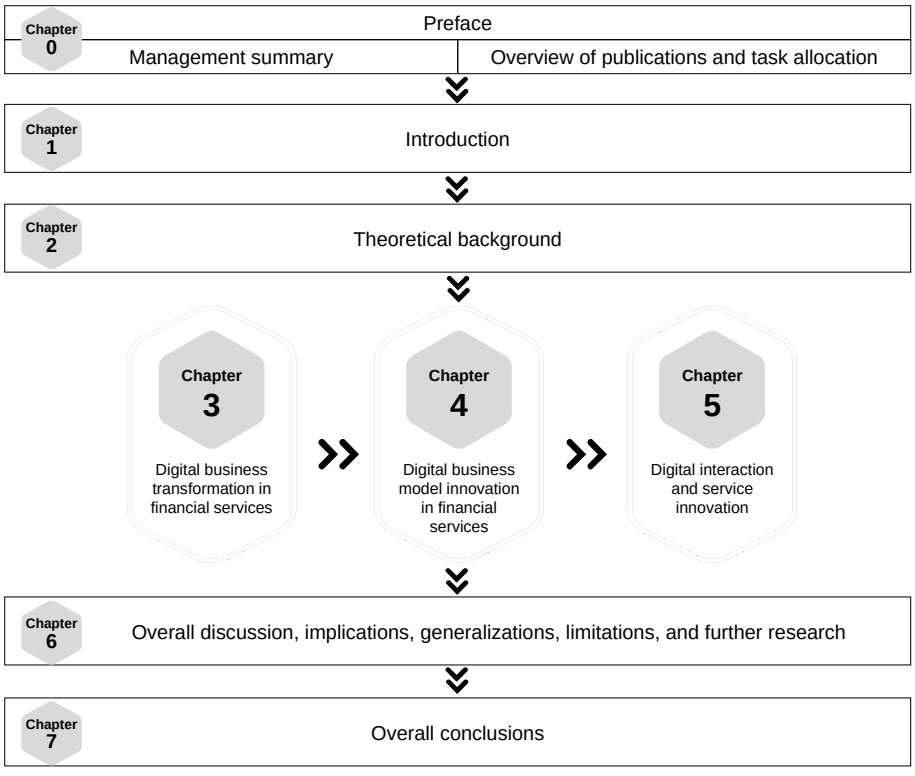

Figure 10: Overview of the cumulative dissertation structure

2 Theoretical Background

2.1 The Path from Innovation to Digital Transformation

Rogers (2010, p. xvii) defines an innovation as “an idea, practice, or object that is perceived as new by an individual or another unit of adoption.” From a wide perspective, an innovation can be given in the form of 1) business process innovations (e.g. new forms of production or organization), 2) governance innovations (e.g. new procedures to solve social problems), 3) conceptual innovations (e.g. new paradigms and reference frameworks) and 4) new product or service innovations such as new customer interfaces (De Vries et al., 2018; Werth et al., 2020). The nature of an innovation can be incremental when it involves minor changes to existing elements, or radical when it entails a completely new set of elements (Setzke et al., 2021).

In the digital era, the concepts of innovation and digital technology are fundamental notions of digital transformation (Kutzner et al., 2018). Bican and Brem (2020, p. 7) conceptualize digital technology as “a segment of technology that is based on electronic data acquisition, processing, or analysis”. For its part, an innovation resulting from the adoption of a digital technology, whether at the ecosystem or organizational level, is recognized in the scientific literature as a digital innovation (Markus & Rowe, 2021; Urbinati et al., 2022). And since the adoption of a digital technology inherently implies an incorporation of digital capabilities into previously analog elements (Warner & Wäger, 2019), the concept of digital innovation can in turn be considered an outcome of the technical process denominated as digitization (Buck & Eder, 2018: Warner & Wäger, 2019; Qi, 2022). At this, processes, tasks, data or objects are transformed from an analog to a digital format (Trischler & Ying, 2022; Kraus et al., 2022). According to Verhoef et al. (2021), digitization is the first of two interconnected phases required to achieve digital transformation. The second phase encompasses a sociotechnical process known as digitalization (Verhoef et al., 2021; Holmström, 2022). Holmström (2022, p. 330) describes this process as “the use of digital technologies and digitized data to shape how work gets done, how customers and firms engage and interact, and how revenues streams are created.” Both digitization and digitalization constitute non-fundamental changes at the operational level (Gong & Ribiere, 2021). By contrast, however, digital transformation entails a fundamental change at the strategic level driven by the widespread diffusion of digital technology and the aggregate effects of the adoption of digital innovations across organizations, industries or fields (Gong & Ribiere, 2021; Hanelt et al., 2021; Ainuaimi et al., 2022). From an organizational standpoint, Vial (2019, p. 118) characterizes digital transformation as “a process where digital technologies create disruptions triggering strategic responses from organizations that seek to alter their value creation paths while managing the structural changes and organizational barriers that affect the positive and negative outcomes

of this process." Thereby, as digital transformation strives to potentiate the creation of value, Ellström et al. (2022) identify the evolution of the business model and the improvement of the customer experience as the primary objectives of digital transformation at the organizational level.

2.2 Digital Transformation in the Financial Services Sector: From Innovation-Based Changes to Digital Disruption

The financial services sector is characterized by its continuous integration of innovative technologies (Werth et al., 2020). To characterize the innovation-based transformational changes undertaken within the financial industry throughout its digital transformation process, Arner et al. (2016) differentiate three progressive stages of technology integration, which have been denoted as FinTech 1.0 (from the years 1866 to 1967), FinTech 2.0 (from the years 1967 to 2008), and FinTech 3.0 (from the year 2008 to the present). In the context of these stages, the term FinTech is used at a general level to describe the facets of incremental or disruptive technology-enabled innovations within the financial services resulting from the diffusion of information technologies (Puschmann, 2017; Alaassar et al., 2023). The first stage (FinTech 1.0) comprises the integration of analog technologies that provided the foundations for the development of legacy systems. Subsequently, the second stage (FinTech 2.0) entails the digitalization of internal operations and primary business process such as payments and risk management. Lastly, the third stage (FinTech 3.0) connotes the effects of the diffusion of new disruptive technologies and the emergence of new born-digital market competitors commonly referred to as FinTech companies or FinTechs (Arner et al., 2016; Locatelli et al., 2021). According to Eickhoff et al. (2017, p. 2) FinTechs are "[…] companies that operate at the intersection of (i) financial products and services and (ii) information technology, [which] are usually (iii) relatively new companies (often startups) with (iv) their own innovative product or service offerings."

Overall, the digital disruption steer by the incorporation of digital innovations based on disruptive technologies (e.g., analytics, mobile, social, cloud, and internet of things technologies) within business processes has changed the intrinsic value mechanisms that frame the conceptualization of traditional business models across major industrial and commercial sectors (Sebastian et al., 2017; Skog et al., 2018; Verhoef et al., 2021), including among them the financial sector through the emergence of FinTech business models (Niemand et al., 2021; Elia et al., 2022). Due to the disruptive power of these latter, FinTech has been regarded in the scientific literature as a paradigm shift (Imerman & Fabozzi, 2020), and therefore as one of the most significant innovations in the financial sector (Iman, 2020; Stefanelli & Ferilli, 2022). This last stage marks the beginning of the ongoing digital transformation of the financial sector driven by FinTech innovations (Chen et al., 2019; Anifa

et al., 2022). Consistent with Gozman et al. (2018), the main underlying value mechanisms of FinTech innovations are the disintermediation (e.g., direct digital interaction between customers and suppliers), the extension of access (e.g., enablement of new participants in the financial sector though a technology-based restructuring of financial information flows), the hybridization (e.g., integration of business models, products and services to leverage innovations), the financialization (e.g., innovative replication of financial services), and the personalization (e.g., digital consolidation of multiple information streams to customize financial services). In order to provide insights into how FinTech innovations are embedded in new digital business models, in the scientific literature diverse classification schemes (e.g., taxonomies and typologies) have been developed from diverse perspectives. For example, Eickhoff et al. (2017) identify 10 FinTech business models archetypes (i.e., cryptocurrency, payment service, financial market intermediary, information aggregator, information extractor, insourcer of sub-processes, lending community, alternative trading venue, robo-advisor, and co-creator of financial analysis) using a business model theory perspective. Conversely, Gomber et al. (2017), Dorfleitner et al. (2017) and Imerman and Fabozzi (2020) apply an ecosystem perspective to delimit FinTech innovations in terms of business segments and functional areas. Gimpel et al. (2018) uses a customer-oriented standpoint to develop a Fintech taxonomy of service offerings around the perspectives of interaction, data, and monetization. Furthermore, Beinke et al. (2018) follows a technology-oriented perspective to determine the business model elements embedded in Blockchain-based FinTechs through a taxonomy, while using the same perspective, Chen et al. (2019) develops a typology comprising seven categories of FinTech innovations to assess the private value of these FinTech innovations using patent fillings and ML. Additionally, some studies provide an integrative view of the extant academic literature to better understand the digital transformation resulting from the digital disruption of the traditional financial services industry (e.g., Barroso & Laborda, 2022; Sun & Wang, 2022; Anifa et al., 2022; Niemand et al., 2021; Boot et al., 2021; Iman, 2020; Breidbach et al., 2020; Alt et al., 2018). Nonetheless, the influence of FinTech innovations in the banking (e.g., Elia et al., 2022; Murinde et al., 2022; Krasonikolakis et al., 2020; Thakor, 2020; Siek and Sutanto, 2019), and insurance sectors (e.g., Neale et al., 2020; Albrecher et al., 2019; Stoeckli et al., 2018) has been examined independently of each other (Werth et al., 2020).

2.3 Digital Transformation and Innovation Processes

The examination of how innovations spread through organizations involves both an individual and an organizational level of analysis. Therefore, a close relative to the field of acceptance research is diffusion research. The focal and most widely use theory of this area of research is the Diffusion of Innovation (DOI) theory of Rogers (2003). DOI theory explains the innovation-decision process to adopt an innovation at a macro perspective. This process

consists of 5 steps: 1) knowledge: the individual or unit of adoption becomes aware of the existence of an innovation and comprehends its functioning, 2) persuasion: the individual or unit of adoption develops an attitude concerning the innovation and weighs possible consequences of adoption or rejection, 3) decision: the individual or unit of adoption makes a decision on whether to adopt or to reject the innovation, 4) implementation: the innovation is used and during its use the individual or unit of adoption evaluates the attributes of the innovation (i.e. relative advantage, compatibility, complexity, trialability and observability), and 5) confirmation: the individual or unit of adoption seeks for information to support its decision (Rogers, 2003; Karnowski and Kümpel, 2016). In line with the aforementioned process of innovation's diffusion, the concept of adoption is contextualized by De Vries et al. (2018, p. 173) as "the result of a diffusion process, in that people or organizations, as part of a social system, may adopt a new idea, behavior, or product once it has been diffused".

2.4 Theoretical Models for Acceptance and Diffusion of Innovations

Teo (2011, p. 1) defines technology acceptance as "a user's willingness to employ a technology for the tasks it is designed to support". In the acceptance research, the decision to employ a technology is determined by knowledge factors (the user's opinion), affective factors (the user's feelings and beliefs), and behavioral factors (the user's attitude towards the actual or intended use) (van Offenbeek et al., 2013; Khan, 2018). The most common user acceptance theories point to describe the underlying causal mechanisms behind the aforementioned user's decision making adoption process are the social-psychology theory of reasoned action (TRA) developed by Fishbein and Ajzen (1975), the theory of planned behavior (TPB) of Ajzen (1991). The TRA is based on the premise that the behavioral intention to adopt is the result of the individual's attitude towards an action, an object or condition, where the attitude is shaped subjectively in form of beliefs based on the information received by the individual and its subjective norm (Fishbein & Ajzen, 1975). In this theory, the subjective norm represents the influence of social environment's expectation on the behavior of an individual materialized in the perceived expectations of important others and the individual's motivation to follow these expectations (Fishbein & Ajzen, 1975). While the TPB is an extension of the TRA that considers an additional theoretical construct denominated as "perceived behavioral control". This additional predictor is based on past experiences and non-motivational factors (e.g. time and skills) to form a subjective estimation of the anticipated obstacles related to performing a behavior (Ajzen, 1991). The theoretical constructs of the TRA and TPB, have been an important base for assessing acceptance levels (De Vries et al., 2018; Khan, 2018). The most widespread model to identify key acceptance factors for innovations at the individual or user level is the technology acceptance model (TAM) proposed by Davis (1989). Since then, the TAM has been systematically modified in order to broaden its explanatory power. This

evolutionary process had led to the conceptualization of more elaborated acceptance models (see e.g., Venkatesh & Davis, 2000; Venkatesh et al., 2003; Venkatesh & Bala, 2008; Alkhamery et al., 2021). In studies related to the digital transformation of the financial services, the TAM has been used to gain theoretical insights about the factors influencing the adoption of various innovations such as e- banking services (e.g., Kitsios et al., 2021; Carranza et al., 2021), online banking (e.g., Albort-Morant et al., 2022), and FinTech services (e.g., Bureshaid et al., 2021).

Since the adoption of technological innovations unfolds at different impact levels (Liere-Netheler et al., 2018), to achieve the broader level of analysis, Hameed et al. (2012) joint the theoretical constructs of TAM, DOI and TPB with the Technology, Organization, Environment (TOE) Model proposed by DePietro et al. (1990). The TOE model is a structural framework which allows to determine the factors influencing the adoption of IS innovations at a technological, organizational and an environmental levels of analysis (DePietro et al. 1990). To analyze the factors influencing the digital transformation, recent academic studies have used the TOE model as a basis for assessing, for instance, the readiness to adopt AI in insurance (Gupta et al., 2022); the organizational readiness for digital business transformation (Alkhamery et al., 2021); the adoption of digital innovations on advisory work (Eden et al., 2021).

3 Digital Business Transformation in Financial Services

3.1 Research Design and Methods

The introduction of digital innovations into the value chain of financial service providers by means of digital transformation strategies has the potential to contribute to unlock further business strategy opportunities (Ross et al., 2016) and transformational capabilities to achieve strategic flexibility as a mean to better adapt to changing customer needs and market dynamics (Weking et al., 2020). Nonetheless, both the impact of the digital strategies to be undertaken and their respective innovation challenges and opportunities differ on a context and industry-specific basis (Kraus et al., 2022). This raises the need to better understand the underlying conditions, implications and barriers surrounding the process of digital transformation embodied in the introduction of digital innovations at differing business application cases and industries (Reis et al., 2018; Kraus et al., 2022). To provide a holistic and systematic overview of the internal and external influencing factors underlying the digital transformation of financial services, in the paper “Influencing Factors for the Digital Transformation in the Financial Services Sector” (Werth et al., 2020) is implemented a PEST analysis model (Aguilar, 1967; Gupta, 2013) conjoined with a Porter's Five Forces model (Porter, 1980). This model combination enables, as a first instance, the analysis at the macroeconomic level, and then with a sector-specific view using the insurance sector and the banking sector as independent units of analysis. The research followed a qualitative research approach, in which focus group-interviews and semi-structured interviews with experts from the banking and insurance sectors were used as methods of data collection. The interview data was analyzed through the application of coding techniques derived from GT (Glaser & Strauss, 1967). The GT coding techniques used involved open coding to discern data patterns through the assignment of initial labels (Glaser, 1978) and selective coding in which the elements of the applied models were used as core categories (i.e., influencing concepts) for framing the identified initial codes (Strauss, 1987).

Furthermore, to enforce new customer-oriented digital services and interfaces, the innovative focus of traditional financial providers strives on the implementation of technological innovations along the front-office business processes of their financial services. However, to facilitate the effective implementation of digital innovations at the front-office level, there is a need to gain insights into the influencing factors and practical implications of these digital innovations on the ways of working (e.g., the structure of employees' tasks and responsibilities) within relevant business processes (Diener & Špacek, 2021). In this regard, the paper “Influences of Digital Innovations on Advisory Work in the Financial Services Sector” (Eden et al., 2022) focuses on addressing the RQ of “how are digital innovations influencing advisory work in the financial services sector, and what implications can be drawn?” To address this

RQ, the research followed a multiple case study design, which was conducted under an interpretive perspective and analyzed using qualitative methods (Myers, 2020). As data collection technique, semi-structured interviews were used to identify and assess the social constructs exhibited by key project stakeholders. These social constructs are materialized in the form of, for instance, opinions, rationales and lessons learned in relation to the impact of implementing front-office technological innovations in the context of advisory work. With a view to determine the influencing factors inherit to advisory work at the technical, organizational and environmental levels, an integrated Technology-Organization-Environment (TOE) framework adapted from DePietro et al. (1990) was utilized as an up-front theory and structural basis for the analysis of two real-world cases involving front-office digital transformation projects that have been implemented in two different German-based financial services companies. In this regard, one of the examined cases belongs to the insurance sector and the other to the banking sector. To analyze the primary data obtained through the aforementioned semi-structured interviews, an evolved GT method consistent with Birks et al. (2013) was applied. This approach encompasses a selection of coding techniques taken from the classical GT method (Glaser & Strauss, 1967; Glaser, 1978; Glaser & Strauss, 1999).

3.2 Models Results and Findings

The paper “Influencing Factors for the Digital Transformation in the Financial Services Sector” (Werth et al., 2020) presents a holistic overview of the internal and external influencing factors of the digital transformation in financial services. A PEST analysis model (Aguilar, 1967; Gupta, 2013) combined Porter's Five Forces (Porter, 1980) was used as a structure for the analysis, as shown in Figure 11.

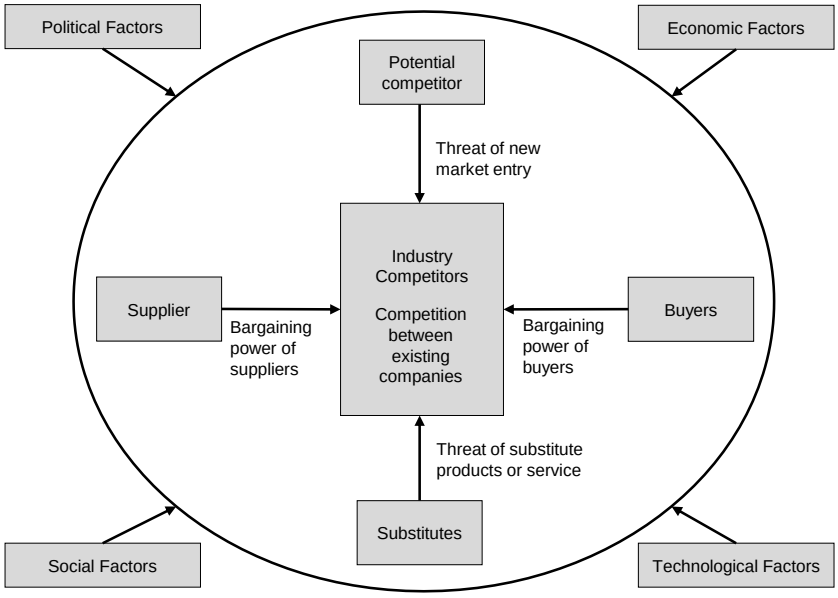

Figure 11: Conjoint Porter’s five forces (industry-internal influences) and PEST- analysis (industry-external influences) model (Werth et al., 2020, p.160)

The combination of aforementioned models provides both a macroeconomic and a sector-specific integrated view. The macro-level of analysis, represented by the external part of the conjoint analysis model (Figure 11), covered political, economic, social and technological macro-level influences on the financial sector. These included, for example, the regulatory constrains brought about by political decisions, the economic influence of low interest rates on the profitability of financial service providers, and the prevailing increasing focus on digital transformation and automation as countermeasures to external factors such as dynamic economic and social developments triggered by technological innovations (Werth et al., 2020). Meanwhile, the external part of the conjoint analysis model covered five influences at the meso-level to offer a sector-internal analysis. The analyzed meso-level influences in line with Porter (1980) were “bargaining power of suppliers,” “bargaining power of buyers,” “threat of new entrants,” “threat of substitute products,” and “rivalry among existing companies.” A total of 15 experts from the banking and insurance sectors were interviewed using semi-structured interviews (*n*= 10) and focus group interviews (*n*= 5) to collect data on relevant external and sector-specific factors. The elements related to Porter's Five Forces and PEST analysis were incorporated into the interview guidelines under the form of questions in connection with the digital transformation in the financial services sector, and were also used as core categories (i.e., influencing concepts) during the interview data the coding process.

As a result, the holistic analysis of the influencing factors underlying the digital transformation of financial services indicated that the insurance and banking sectors both encounter common challenges at the macro-level regardless of their structural differences. Nonetheless, at the meso-level the impact of factors relating to socio-cultural changes and shifts in the bargaining power of buyers are comparatively more significant in the banking sector. In consonance with this, a faster pace in the development of digital transformation initiatives along with an increased pressure to implement new digital channels is observed in the banking sector (Werth et al., 2020).

Furthermore, in the context of examining the digital transformation of front-end processes, through a multiple case analysis in the paper “Influences of Digital Innovations on Advisory Work in the Financial Services Sector” (Eden et al., 2022) were identified 13 ambivalent influencing factors of technological innovations focused towards advisory work. For the purpose of the analysis, advisory work was defined as “the use of human, informational, physical, and other resources for the process of establishing and defining a relationship with (mostly private) customers; gathering and analyzing information about their status, needs, and wishes; deriving, presenting, and informing about the resulting recommendations; concluding the suitable financial services contracts and consecutively assisting and monitoring throughout the existence of the relationship” (Eden et al., 2022, p. 7). The analyzed cases included two

front-office digital transformation projects to support the advisor-customer relationship, one of them implemented in the insurance sector (Case 1) which involved the introduction of a customer portal, and the other carried out in the banking sector (Case 2) which entailed the implementation of video advisory. For a detailed description of the cases, refer to the full paper "Influences of Digital Innovations on Advisory Work in the Financial Services Sector" [6] (Eden et al., 2022). A total of 17 semi-structured interviews (Case 1, *n*= 7; Case 2, *n*= 10) with key stakeholders of these front-office digital transformation projects were conducted. To analyze the interview data, consistent with the evolved GT method (Birks et al., 2013) the selection of coding techniques borrowed from the classical GT method (Glaser & Strauss, 1967; Glaser, 1978; Glaser & Strauss, 1999) consisted of the used of axial coding to incorporate the elements of the TOE framework, i.e., technology, organization and environment (Glaser, 1978; DePietro et al., 1990) and selective coding (Strauss, 1987).

Based on this analysis, for the technological context, the following elements were identified as influencing factors: independence of interaction, IT capabilities, operational barriers, technology task fit, as well as the relative advantages of the technology. While elements such as the technical competencies of employees, inter-dependencies between the corporate value chain processes of the company, the role of opinion leaders (i.e., opinion leadership), the governance structure, along with the decision-making and commitment of top management were identified as influencing factors for the organizational context. In addition, in terms of the environmental context, the regulatory environment, customer empowerment as well as the competitive intensity and pressures were found to be relevant influencing factors (Eden et al., 2022).Subsequently, the aforementioned influencing factors were integrated into the following practical propositions synthesizing both the transformational changes on advisory work and the implications for financial service providers:

"Proposition 1: The adoption of digital supporting technologies and new multi-channel touchpoints in advisory work significantly impacts the level of perceived control as well as the visibility of the workflows and tasks within the advisory process – both for the customer and the advisor" (Eden et al., 2022, p. 13)

"Proposition 2a: The company's governance structure significantly impacts the acceptance level of digital innovations in advisory work by internal users" (Eden et al., 2022, p. 13)

"Proposition 2b: The digital connections between the back and front-offices workflows of the advisory process significantly impacts the levels of digital optimization and operational feasibility of the front-office capabilities in the financial services sector" (Eden et al., 2022, p. 14).

“Proposition 3: The company’s environment, i.e., competitive pressure, demand for skilled working force, and regulation, significantly influences implementations of digital innovations in advisory work” (Eden et al., 2022, p. 15).

These practical propositions are associated with the identified influencing factors within the different contexts of the TOE framework (i.e., technology, organization and environment), as illustrated in Figure 12.

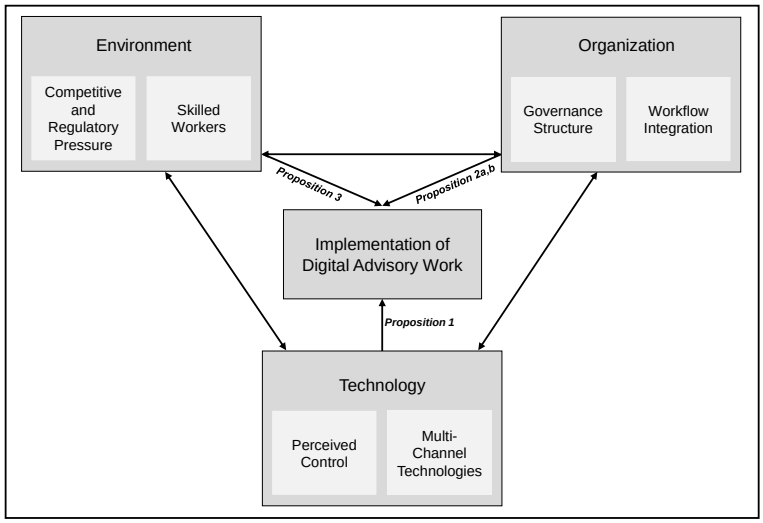

Figure 12: Integrated adapted technology-organization-environment framework following DePietro et al. 1990

These propositions involve at the organizational context, realigning and further developing digital capabilities along with accelerating the speed of innovation at the back-office level in order to reconcile the technological innovations driven at the front-end business operations level. Meanwhile, on a practical basis, at the technological context the introduction of digital innovations was found to have divergent effects on the perception of visibility and control of workflow processes by employees, leading to additional challenges in terms of internal acceptance of new technical solutions. As regards the environmental context, factors such as levels of competitive pressure and the shortage of skilled labor were found to be driving factors for the adoption of technological innovations, while the influence of regulations, on the other hand, was found to be a limiting factor (Eden et al., 2022).

4 Digital Business Model Innovation in Financial Services

4.1 Research Design and Methods

FinTech ventures have a particularly high failure rate (Ng et al., 2023), which can be as high as 90% in their first 6 years (Muthukannan et al., 2020). Therefore, the sustainability of these digital business models is a critical challenge for FinTech (Ng et al., 2023; Hwang et al., 2022). To support the sustainable development of FinTech business models, a detailed understanding of the strategic aspects that contribute to enhance the chances to achieve FinTech success is required (Ng et al., 2023). Nonetheless, FinTech success is still an understudied topic in the scientific literature (Gomber et al., 2017) and the existing knowledge on this topic has been mostly generated on a fragmented basis (Imerman & Fabozzi, 2020). Hence, as a first step to contribute to address this gap from a business model perspective, the paper “Make or Break: Business Model Determinants of FinTech Venture Success” (Roeder et al., 2018) deals with the RQ of “which theoretically grounded factors are potentially relevant for FinTech venture success across distinct FinTech archetypes and business model dimensions?” To identify the business model determinants for the success of FinTech ventures, the paper followed a quantitative research design. As statistical analysis method, a multiple regression analysis was conducted on data from 221 FinTech companies, using total funding as proxy measure for the potential success of FinTech companies.

Afterwards, the paper “Challenges of the Financial Industry - An Analysis of Critical Success Factors for FinTechs” (Werth et al., 2019) answers the RQ “what are the distinctive CSFs for FinTechs and general ventures?” To this end, this research work used a qualitative research design. Thereby, the primary qualitative data were collected through semi-structured interviews and the data analysis was conducted employing a GT-based coding analysis method that consisted of the application of open coding (line-by-line coding), axial coding, selective coding and theoretical coding techniques (Birks et al., 2013; Wiesche et al., 2017). Aiming to provide a holistic view of the CSFs for FinTechs from an entrepreneurial and venture capital (VC) perspective, the semi-structured interviews were carried out with 10 managers and chief executive officers of FinTechs, as well as with eight venture capitalists (VCs). The CSFs abstracted from the interviews were inductively contrasted with the scientific literature on CSFs for business models in general terms and VCs' decision criteria obtained through a literature review.

Furthermore, the paper “What Determines Fintech Success? A Taxonomy-Based Analysis of FinTech Success Factors” (Werth et al., 2023) addresses the RQ: “which theoretically grounded factors are potentially relevant for FinTech venture success across distinct FinTech archetypes and business model dimensions?” In order to answer this RQ a taxonomy-based

analysis approach was used. In this regard, to collect the dispersed scientific knowledge that exists on the potential determinants of success in distinct FinTech segments, as a first instance ten lateral literature reviews related to the FinTech business models archetypes identified by Eickhoff et al. (2017) were conducted according to the systematic literature review methodology of Webster and Watson (2002), as illustrated below in Figure 13 . After that, the 231 relevant scientific articles were analyzed using content analysis as qualitative research technique to interpret the data. Later, the taxonomy development method of Nickerson et al. (2003) was coupled with the content analysis technique to systematically categorize the identified FinTech success factors into a taxonomic structure. Lastly, a case-based taxonomy validation in line with Kundisch et al. (2021) and two interviews with FinTech stakeholders were performed to demonstrate the applicability of the taxonomy.

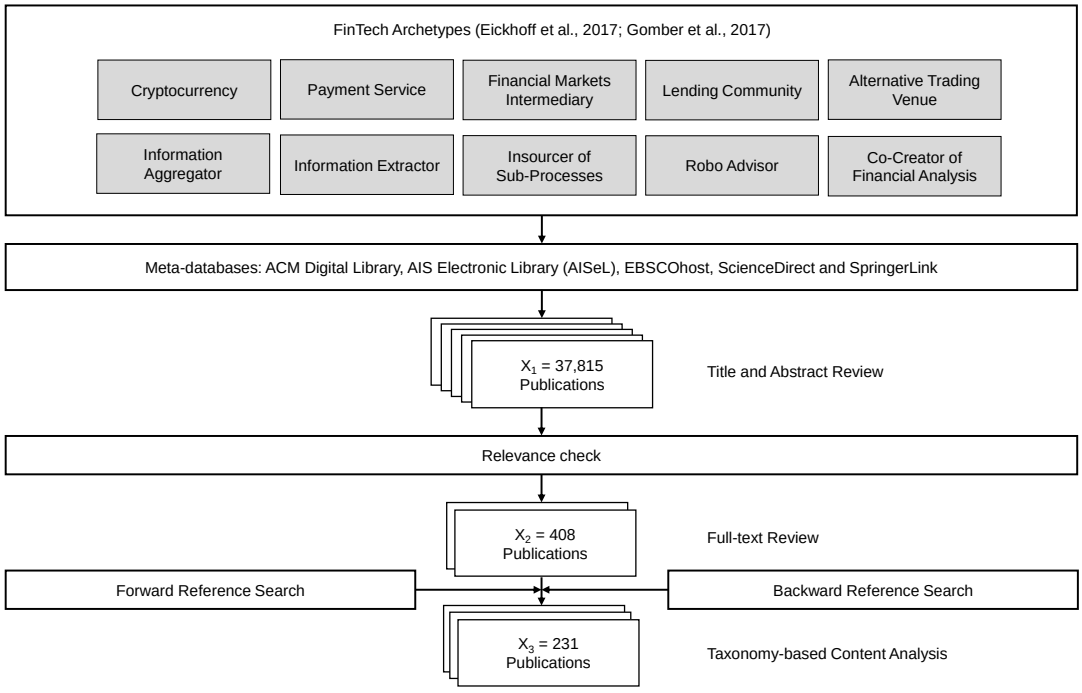

Figure 13: Literature review process related to the FinTech business models archetypes

4.2 Models Results and Findings

4.2.1 Business Model Determinants of FinTech Venture Success

To empirically identify the business model determinants for the success of FinTech ventures, the paper “Make or Break: Business Model Determinants of FinTech Venture Success” (Roeder et al., 2018) presents a multiple linear regression analysis model. The overall research design applied in this paper has been previously described in the preceding chapter. In the following, a more in-depth description of the multiple regression analysis model and its constituent variables is provided. The intrinsic model structure is built upon the six business model dimensions and 45 characteristics proposed by the FinTech business model taxonomy of Eickhoff et al. (2017), which are outlined in Table 5. This taxonomic structure was utilized

for the empirical categorization of 221 FinTech ventures, whereby only one fitting characteristic from each dimension was assigned to each analyzed FinTech venture.

Table 5: Taxonomy dimensions and characteristics of Eickhoff et al. (2017, p. 10)

Dimension	Characteristics
Dominant Technology Component	Blockchain, Digital Platform, Decision Support System, Database, Marketplace, Transaction Processing System
Value Proposition	Automation, Collaboration, Customization, Insight, Matching/ Intermediation, Monetary, Financial Risk, Transparency, Unification/Consolidation, Security, Convenience/Usability
Delivery Channel	Application Programming Interface, App, Physical, WWW, WWW + App, Instant Message
Customers	Business-to-Business, Business-to-Customer, Business-to-Business + Business-to-Customer
Revenue Stream	Kickback, Pay Per Use, Revenue Share, Sales, Subscription, Unknown, Free, Hybrid
Product/Service Offering	Information Aggregation, Brokerage, Currency Exchange, Current Account, Device, Financial Education, Financing, Investments, Payment Service, Personal Assistant, Lending/Credit, Fraud Prevention, User Identification

The degree of dependence between the discrete variables (i.e. dimensions) was measure using Cramér's V (Cramér, 1999), resulting in moderate correlations at most for each pair of discrete variables analyzed, as shown in Figure 14.

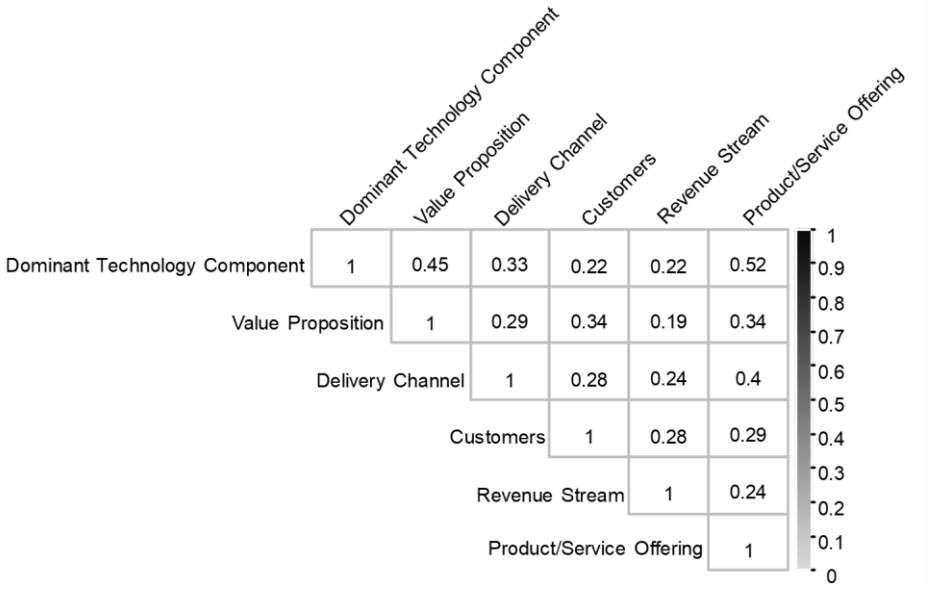

Figure 14: Strength of association between the FinTech business model taxonomy dimensions in line with Roeder et al. (2018, p. 1227)

In order to assess the degree of significance relative to the taxonomic dimensions in relation to FinTech venture success, a multiple regression analysis was conducted. For the effects of this analysis, FinTech venture success was conceptualized unidimensionally. Thereby, following a resource-based notion of FinTech success, the total value of VC funding (i.e., aggregated received funding in USD) was operationalized as a proxy variable of success (Roeder et al., 2018).

As explanatory variables, the six taxonomy dimensions, constituted by 45 characteristics, were incorporated into the regression through the use of dummy coding (Cohen et al., 2003). The number of significant variables (p-values<0.1) per dimension is shown in Table 6.

Table 6: Significant predictor variables per taxonomy dimension corresponding to Roeder et al. (2018, p. 1228)

Name	Significant Variables	Total Variables
Dominant Technology Component	0	5
Value Proposition	0	10
Delivery Channel	0	4
Customers	0	2
Revenue Stream	0	7
Product/Service Offering	3	11

In accordance with this, when FinTech success is measured in terms of total funding, the FinTech business model component “Product/service offering” was identified as the most significant business model determinant of FinTech venture success. In particular, as detailed in Table 7, the characteristics of “Credit Lending,” “Financing,” and “Information Aggregation” were found to be statistically significant in the taxonomy dimension “Product/service offering.”

Table 7: Excerpt from the multiple regression analysis referring to the taxonomy dimension “Product/Service Offering” as stated in Roeder et al. (2018, p. 1228)

Name	Estimate	Std. Error	t-value	Pr(>|t|)
Intercept	-22.944	70.575	-0.325	0.746
Product/Service Offering				
Credit Lending	92.686***	27.265	3.399	<0.001
Currency Exchange	18.347	37.167	0.494	0.622
Device	-46.818	103.951	-0.450	0.653
Financial Education	37.666	39.778	0.947	0.345
Financing	60.204*	33.809	1.781	0.077
Fraud Prevention	42.388	46.656	0.909	0.365
Information Aggregation	51.982*	27.393	1.898	0.060
Investments	39.830	28.159	2.377	0.019
Payment Services	19.432	28.713	0.677	0.500
Personal Assistant	25.962	29.423	0.882	0.379
User Identification	29.543	51.560	0.573	0.568
Observations				221
R^2				0.702
Adjusted R^2				0.544
Residual Std. Error				48.449
F-Statistics				4.457***
Note:	*: p<0.1; **: p<0.05; ***: p<0.01			

In light of the absolute frequency of the taxonomy characteristics, the above suggest that the product/service offerings with the characteristics illustrated in Table 8 have the potential to receive a higher level of funding and are more likelihood of success.

Table 8: Number of significant predictor variables (dummy coded) per taxonomy dimension from Roeder et al. (2018, p. 1229)

Dominant Technology Component	Value Proposition	Delivery Channel	Customers	Revenue Stream	Product/ Service Offering
Marketplace	Matching/ Intermediation	www	Business-to-Customer	Unknown	Credit Lending
Marketplace	Matching/ Intermediation	www	Business-to-Business	Unknown	Financing
Decision Support System	Insight	App	Business-to-Business	Unknown	Information Aggregation

4.2.2 Success Factors for FinTechs

The paper “Challenges of the Financial Industry - An Analysis of Critical Success Factors for FinTechs” (Werth et al., 2019) provides a qualitative analysis of the differences between the success factors that are idiosyncratic for FinTech ventures (FinTechs), with respect to those established in the scientific literature for business models at a general level. Through inductive coding and the adoption of an interpretivist perspective (Klein & Myers, 1999), 15 CSFs applicable to FinTech ventures were identified, which are depicted in Figure 15. Among these CSFs, nine are found to be systematic in nature, which include “team,” “entrepreneur,” “capital,” “product/market fit,” “idea and execution,” “pivoting and continuous learning,” “customer acquisition,” “internationalization and networking” (Werth et al., 2019, p. 4). In turn, the remaining CSFs were found to be specific to FinTech ventures and mostly related to technical (i.e., technological advantage), regulatory compliance (i.e., regulatory knowledge), and strategic (i.e., B2B focus, incumbent partnerships, growth potential, exist options for VCs) capabilities.

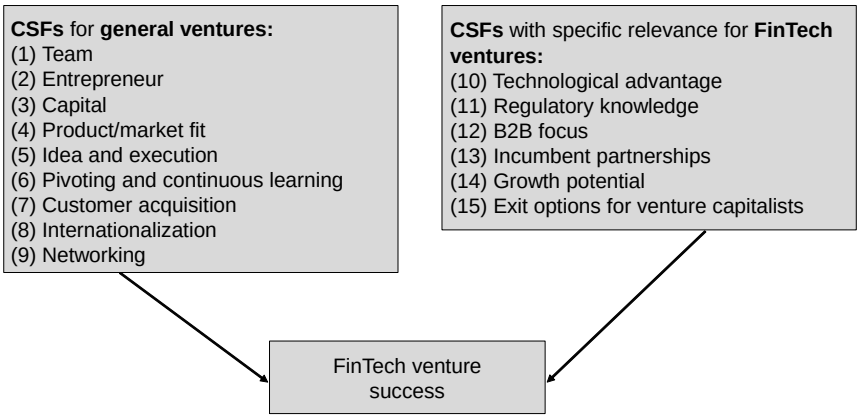

Figure 15: Critical success factors for general ventures and FinTech ventures conforming to Werth et al. (2019, p. 5)

To provide more granular insights into the potential determinants of success for different FinTech business model archetypes, the paper “What Determines Fintech Success? A

Taxonomy-Based Analysis of FinTech Success Factors" (Werth et al., 2023) presents a taxonomy of FinTech Success Factors. One way of structuring and consolidating existing theoretical and empirical knowledge in a specific field is to arrange objects of research according to their distinctive characteristics into different classes or groups using classification mechanisms, such as taxonomies (Usman et al., 2017: Kundisch et al., 2021). A taxonomy (*T*) is a classification method that allows to systematize existing knowledge as a function of a logical structure composed by a set of dimensions (D_i), each of which is in turn comprised by a subset (k_i) of characteristics ($C_{i,j}$) (Nickerson et al., 2013), as illustrated in Equation (1).

$$T = \{D_{i,} i = 1, \dots, n | D_i = \{C_{ij}, j = 1, \dots, k_i; k_i \geq 2\} \quad (1)$$

For the taxonomy-based analysis performed, the study adopted the taxonomy development method proposed by Nickerson et al. (2013). This systematic method allows the iterative integration of theoretical knowledge and empirical evidence in relation to a meta-characteristic, by alternating deductive (conceptual-to-empirical) and inductive (empirical-to-conceptual) iterations (Nickerson et al., 2013). The conceptual-to-empirical approach of the method, enables the conceptualization of a preliminary taxonomic structure abstracted from extant knowledge on a topic, rather than from the examination of a subset of existing objects to be classified, as is the case in an empirical-to-conceptual approach (Nickerson et al., 2013). According to the procedure described in Figure 16, a set of 231 scientific articles related to multiple conceptualizations of success across distinct Fintech business model archetypes were empirically analyzed through content analysis and subsequently categorized into a conceptually derived taxonomic structure.

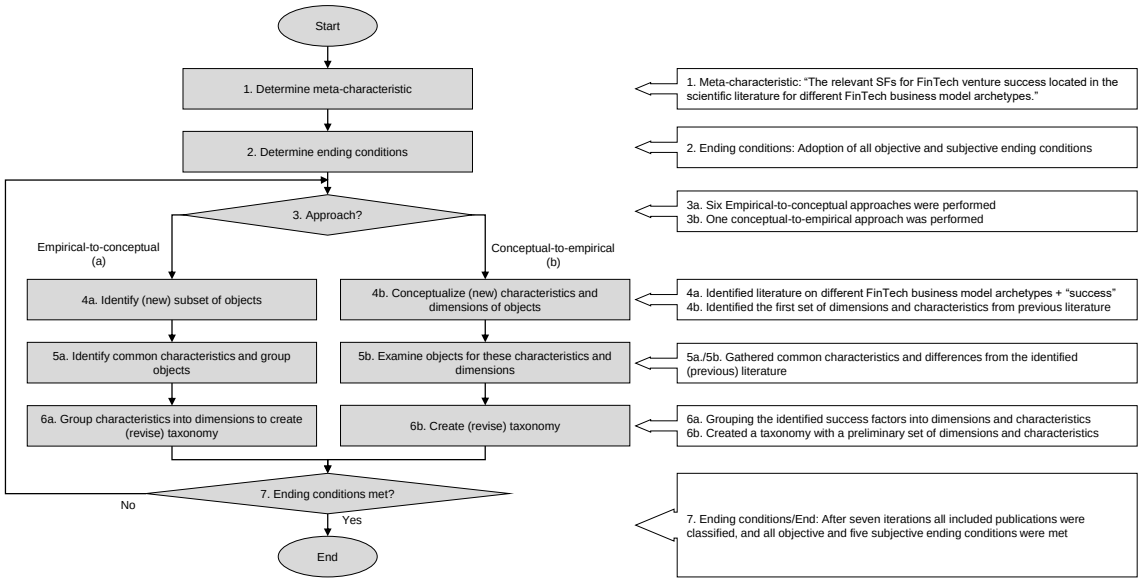

Figure 16: Taxonomy development method based on Nickerson et al. (2013) followed in Werth et al. (2023, p. 4)

The development of the final taxonomic structure was completed within one conceptual-to-empirical and six empirical-to-conceptual approaches. As a result, seven taxonomy dimensions composed of 31 factors associated with FinTech success were identified, as detailed in Table 9.

Table 9: Final taxonomic structure of FinTech success factors by Werth et al. (2023. p. 9)

Dimensions D_i	Characteristics $C_{i,j}$		
D_1 Strategic factors	$C_{1,1}$ Corporate plan	$C_{1,2}$ Operational design	
	$C_{1,3}$ Competitive plan	$C_{1,4}$ Marketing plan	
D_2 Operational factors	$C_{2,1}$ Competency-based human resources	$C_{2,2}$ Strategic networks and alliances	
	$C_{2,3}$ Operational alignment	$C_{2,4}$ Cost-benefit dynamic of the innovation	$C_{2,5}$ Efficiency
D_3 Technological factors	$C_{3,1}$ Technology integration	$C_{3,2}$ Technology adoption	
	$C_{3,3}$ Security, privacy and transparency	$C_{3,4}$ Environmental sustainability	$C_{3,5}$ Ethical issues
D_4 Value proposition	$C_{4,1}$ Convenience/ usability	$C_{4,2}$ Customization	$C_{4,3}$ Intermediation
	$C_{4,4}$ Monetary	$C_{4,5}$ Disintermediation	$C_{4,6}$ Decision support
D_5 User factors	$C_{5,1}$ User socio-economic characteristics	$C_{5,2}$ User centricity	$C_{5,3}$ User trust
	$C_{5,4}$ User-perceived quality	$C_{5,5}$ Cost attractiveness	$C_{5,6}$ Ease of use
D_6 Economic factors	$C_{6,1}$ Financial capital	$C_{6,2}$ Cost structure	
D_7 Environmental factors	$C_{7,1}$ Industry rivalry	$C_{7,2}$ Market conditions	$C_{7,3}$ Regulation

The degree of generality of the aforementioned success factors at each FinTech archetype was estimated through the determination of the relative frequency distribution of the factors, whose results are presented per FinTech business model archetype in Figure 17.

	D1 Strategic factors				D2 Operational factors					D3 Technological factors					D4 Value proposition						D5 User factors						D6 Economic factors		D7 Environmental factors			Cumulative percentage per FinTech archetype
	$C_{1,1}$ Corporate plan	$C_{1,2}$ Operational design	$C_{1,3}$ Competitive plan	$C_{1,4}$ Marketing plan	$C_{2,1}$ Competency-based human resources	$C_{2,2}$ Strategic networks and alliances	$C_{2,3}$ Operational alignment	$C_{2,4}$ Cost-benefit dynamic of the innovation	$C_{2,5}$ Efficiency	$C_{3,1}$ Technology integration	$C_{3,2}$ Technology adoption	$C_{3,3}$ Security, privacy and transparency	$C_{3,4}$ Environmental sustainability	$C_{3,5}$ Ethical issues	$C_{4,1}$ Convenience/usability	$C_{4,2}$ Customization	$C_{4,3}$ Intermediation	$C_{4,4}$ Monetary	$C_{4,5}$ Disintermediation	$C_{4,6}$ Decision support	$C_{5,1}$ User socio-economic characteristics	$C_{5,2}$ User centricity	$C_{5,3}$ User trust	$C_{5,4}$ User-perceived quality	$C_{5,5}$ Cost attractiveness	$C_{5,6}$ Ease of use	$C_{6,1}$ Financial capital	$C_{6,2}$ Cost structure	$C_{7,1}$ Industry rivalry	$C_{7,2}$ Market conditions	$C_{7,3}$ Regulation	
Alternative trading venue	3%	4%	3%	4%	2%	7%	2%	3%	2%	6%	10%	4%	0%	0%	0%	0%	8%	4%	1%	0%	4%	4%	6%	6%	0%	3%	5%	1%	3%	2%	3%	100%
Co-creator of financial analysis	9%	6%	11%	0%	9%	6%	3%	6%	6%	0%	6%	14%	0%	0%	0%	0%	0%	0%	0%	9%	0%	0%	3%	0%	0%	3%	0%	3%	6%	0%	3%	100%
Cryptocurrency	0%	4%	4%	1%	0%	7%	3%	7%	4%	9%	8%	10%	1%	1%	0%	0%	1%	3%	5%	0%	2%	0%	5%	1%	2%	2%	0%	7%	2%	4%	8%	100%
Information aggregator	0%	6%	0%	0%	6%	6%	0%	19%	6%	0%	0%	6%	0%	0%	0%	0%	6%	0%	0%	0%	6%	0%	6%	6%	6%	0%	6%	0%	0%	6%	6%	100%
Insourcer of sub-processes	2%	8%	7%	1%	3%	4%	1%	5%	4%	6%	8%	9%	1%	0%	8%	0%	0%	0%	0%	0%	3%	2%	4%	5%	4%	3%	1%	6%	4%	3%	3%	100%
Lending community	0%	3%	1%	4%	1%	3%	1%	1%	1%	15%	16%	1%	0%	0%	1%	0%	12%	1%	0%	0%	9%	5%	4%	4%	0%	3%	7%	0%	4%	1%	0%	100%
Payment services	4%	2%	7%	0%	1%	5%	0%	2%	1%	10%	8%	7%	0%	0%	2%	2%	3%	0%	0%	0%	5%	3%	11%	2%	3%	7%	0%	2%	4%	3%	4%	100%
Robo-advisor	0%	4%	4%	7%	4%	0%	0%	0%	7%	4%	4%	11%	0%	0%	0%	0%	0%	0%	0%	4%	4%	7%	7%	11%	0%	7%	0%	4%	11%	0%	4%	100%

Note: Bold black border= most relevant success factors per FinTech business model archetype; Gray box= most relevant success factors per dimension; no literature was found for the business model archetypes "Financial markets intermediary" and "Information extractor"

Figure 17: Relative frequency distribution of the FinTech success factors identified by Werth et al. (2023, p. 11)

Thereby, six factors were further defined as significant operational, technological, user and environmental challenges (“grand challenges”) for the FinTech industry, these being “cost-benefit dynamic of the innovation,” “technology adoption,” “security, privacy, and transparency,” “user trust,” “user-perceived quality,” and “industry rivalry” (Werth et al., 2023). The results of the taxonomy-based analysis were corroborated using two expert interviews and a case-based taxonomy validation approach targeting Fintech ventures with late stage venture funding (i.e., Series C FinTechs) (Crunchbase, 2023).

5 Digital Interaction and Service Innovation

5.1 Research Design and Methods

As in the manufacturing sector, the companies in the service sector are not only under increased pressure to revolutionize their internal processes, but also the way they deliver their value propositions to their customers (Teicher, 2019; Rha & Lee, 2022). As part of the digital transformation process of the financial industry, incumbent financial service providers have increasingly sought to adopt artificial intelligence (AI) innovations such as chatbots (Luo et al., 2022). However, traditional sectors such as the financial industry predominantly experience difficulties during the implementation of new digital approaches, being this an issue that has not yet been comprehensively addressed in the current scientific literature (Nadkarni et al., 2020; Diener & Špacek, 2021). One of the main constrains for facilitating the adoption and diffusion of chatbot technology is that the essential academic knowledge to support chatbot development and design process, both in theory and in practice, has grown in a segregated and unstructured manner (Luo et al., 2022; Diederich et al., 2022). This has consequently generated ambiguity with regard to the extant technical terminology (Elshan et al., 2022), and design concepts across different industries and application domains (Caldarini et al., 2022).

With the aim to contribute to the understanding of the existing range of chatbot features in different application domains and to determine the state-of-the-art of chatbots in practice, as a first step, the paper “Virtual Assistance in any Context: A Taxonomy of Design Elements for Domain-Specific Chatbots” (Janssen et al., 2020) answers the RQs of “what are the conceptually grounded and empirically validated design elements for domain-specific Chatbots?” and “which chatbot archetypes can be empirically identified across diverse application domains?” Thereafter, given that the academic research on the topic of chatbots in B2B business contexts is so far comparably understudied (Kraus et al., 2022), the paper “More than FAQ! Chatbot Taxonomy for Business-to-Business Customer Services” (Janssen et al., 2021a) presents a study of the existing context-specific design elements and applications of chatbots for B2B customer services by focusing on addressing the RQs of “which conceptually grounded and empirically validated design elements for B2B customer service chatbots exist?” and “which archetypes can be empirically deduced for B2B customer services chatbots?” Lastly, to further contribute to the standardization of chatbots, the paper “See You Soon Again, Chatbot? A Design Taxonomy to Characterize User-Chatbot Relationships with Different Time Horizons” (Nissen et al., 2021) provides an integrated view of the structural design differences of chatbots in relation to distinct contextual temporal profiles by dealing with the RQs of “which design elements allow us to distinguish chatbots depending on whether they are aimed to help individuals to achieve short-, medium- or long-term goals?” and “how does a chatbot’s temporal profile affect its design?” To address the above RQs, the aforementioned papers on chatbot

design elements applied the taxonomy development method proposed by Nickerson et al. (2003). Furthermore, statistical methods such as Ward's method of hierarchical clustering (i.e., Janssen et al., 2020; Janssen et al., 2021a) or frequency clustering (i.e., Nissen et al., 2021) were used for the empirical identification of archetypes.

Subsequently, given that there is still limited scientific literature on the adoption and implementation of chatbot technology in a financial context (Luo et al., 2022). To gain a deeper understanding of the potential ambivalence related to using chatbots in the financial services industry, the paper “A Mixed Methods Analysis of the Adoption and Diffusion of Chatbot Technology in the German Insurance Sector” (Rodríguez Cardona et al., 2019) addresses the RQ of “which socio-technical factors influence (positively or negatively) the adoption and diffusion of chatbot technology in the insurance sector?” To address this question, the research followed an exploratory sequential mixed methods design conducted under an interpretive perspective (Klein & Myers, 1999). Thereby, a qualitative-quantitative approach was applied. In the first qualitative phase, semi-structured interviews with relevant stakeholders were used as data collection technique. Afterwards, the collected research data were analyzed by means of a qualitative content analysis. In the second conjoined quantitative phase, to reinforce the socio-technical knowledge obtained from the interviews, a cross sectional survey addressed to potential chatbot users was conducted, and then successively the survey results were statistically analyzed.

As a next step, the effects of trust and privacy concerns on the intention to use chatbots in a financial context are analyzed. In IS research, these two factors have been conjectured to be relevant factors for the adoption of new technologies (Ryu & Ko, 2020). However, in spite of this, academic research on these potential determining factors at financial and customer service contexts is still in an early stage (Rodríguez Cardona et al., 2019; Luo et al., 2021). To contribute to address this gap, the paper “A Matter of Trust? Examination of Chatbot Usage in Insurance Business” (Rodríguez Cardona et al., 2021a) examines the RQ of “how trust, privacy concerns, perceived ease of use, and perceived usefulness effect the intention to interact with insurance chatbots?” through the application of PLS-SEM. To operationalize the theoretical constructs of the structural equation model, a cross-sectional survey was used as data collection technique.

Furthermore, the paper “How to Make Chatbots Productive - A User-Oriented Implementation Framework” (Janssen et al., 2022) uses a DSR approach in conformity with Vaishnavi and Kuechler (2015) to develop a framework for user-centered design and implementation of chatbots. To this end, this paper focuses on the RQ “what questions need to be considered in a user-oriented chatbot implementation and how can these questions be structured in an

implementation framework?" On that basis, the aim of the paper is to provide practitioners with prescriptive knowledge to make informed implementation decisions with the future user as focal point (Janssen et al., 2020) as well as to facilitate future research on chatbot deployment to bridge the knowledge gap between design and implementation of digital transformation efforts in corporate environments (Agarwal et al., 2022). The primary data for the construction of the framework were collected through semi-structured interviews with professional developers and in-house experts in chatbot development process. To identify the implementation conditions, relevant key issues and the different phases involved in the implementation process of chatbots, the interview data were analyzed using content analysis as qualitative research method. Afterwards, the results of the qualitative analysis were consolidated with insights drawn from the human-computer interaction (HCI) literature and structured in terms of the established PACT model of Benyon (2014; 2019) [2], [3]. Subsequently, the scientific rigor of the framework was evaluated by means of additional expert interviews, a focus group discussion and the application of a case study. Lastly, the results of the research methods described above, were consolidated in the form of an eight step PACT model. An overview of the research design is provided in Figure 18.

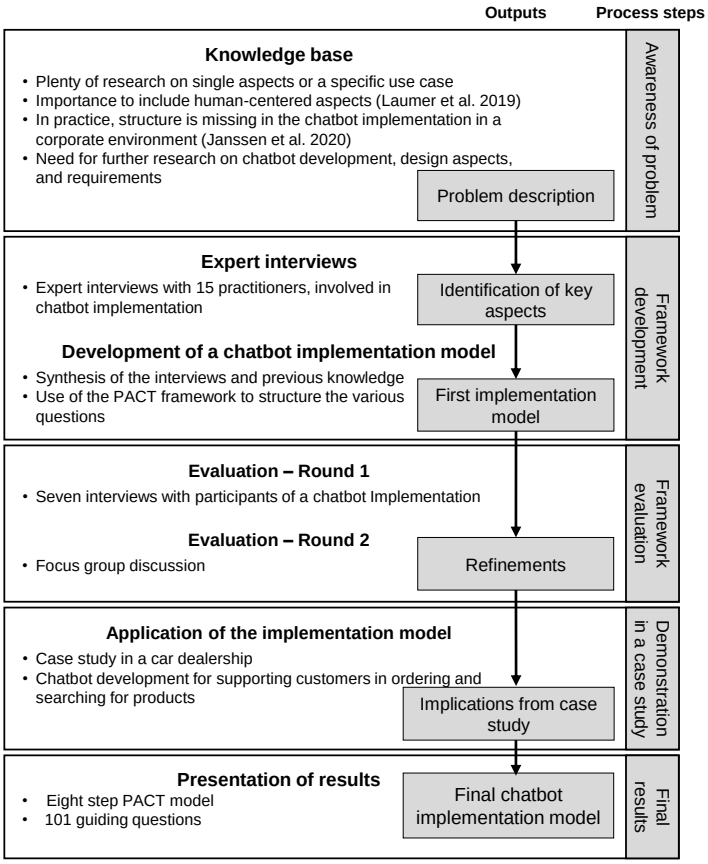

Figure 18: Research design on the basis of Vaishnavi and Kuechler (2015) followed by Janssen et al. (2022, p. 2)

5.2 Models Results and Findings

5.2.1 Chatbot Design Elements and Archetypes

The findings described below are related to the results of the papers “Virtual Assistance in any Context: A Taxonomy of Design Elements for Domain-Specific Chatbots Influencing Factors for the Digital Transformation in the Financial Services Sector” (Janssen et al., 2020), “More than FAQ! Chatbot Taxonomy for Business-to-Business Customer Services” (Janssen et al., 2021a), and “See You Soon Again, Chatbot? A Design Taxonomy to Characterize User-Chatbot Relationships with Different Time Horizons” (Nissen et al., 2022). These three papers identify chatbot design elements using the taxonomy development approach proposed by Nickerson et al. (2003), which has been previously described in section 4.2.2. Below the outcomes of these taxonomies are described according to the different approaches followed by each of the aforementioned papers:

For domain-specific chatbots: The final taxonomic structure developed in “Virtual Assistance in any Context: A Taxonomy of Design Elements for Domain-Specific Chatbots Influencing Factors for the Digital Transformation in the Financial Services Sector” (Janssen et al., 2020), was derived in terms of the meta-characteristic delineated as “the design elements for domain-specific chatbots.” The taxonomy development process adopted as initial approach a conceptual-to-empirical perspective, according to which a review of the scientific literature on chatbot design was initially conducted in order to deductively abstract an initial set of conceptual dimensions and characteristics. Subsequently, 103 chatbots belonging to 23 application domains were empirically classified to refine the initial taxonomy. All the objective and subjective adopted ending conditions were met after five iterations (i.e., one deductive and four inductive iterations paths). The final taxonomic structure encompasses 17 dimensions and 49 design characteristics. These were divided along the thematic perspectives of interaction, intelligence and context, as shown in Table 10 . Additionally, based on the outcome of a hierarchical clustering approach using Ward's method (Ward, 1963), five chatbot archetypes were defined, namely “goal-oriented daily chatbot,” “non goal-oriented daily chatbot,” “utility facilitator chatbot,” “utility expert chatbot,” and “relationship-oriented chatbot” (Janssen et al., 2020, p. 220). Through these archetypes, gaps between research and practice were evidenced with respect to the limited practical incorporation of advanced technical chatbot characteristics pertaining to both the intelligence and interaction perspectives since, for example, complex theoretical capabilities for chatbots such as socio-emotional behavior, text mining, and analytics were found to be in a nascent state within chatbot deployments in practice.

Table 10: Final taxonomy of design elements for domain-specific chatbots as stated by Janssen et al. (2020, p. 217)

Layer 1: Perspective	Layer 2: Dimensions D_i	Layer 3: Characteristics $C_{i,j}$		
Intelligence	D_1 Intelligence framework	$C_{1,1}$ Rule-based system	$C_{1,2}$ Utility-based system	$C_{1,3}$ Model-based system
		$C_{1,4}$ Goal-based system	$C_{1,5}$ Self-learning system	
	D_2 Intelligence quotient	$C_{2,1}$ Only rule-based knowledge	$C_{2,2}$ Text understanding	$C_{2,3}$ Text understanding and further abilities
	D_3 Personality processing	$C_{3,1}$ Principal self	$C_{3,2}$ Adaptive self	
	D_4 Socio-emotional behavior	$C_{4,1}$ Not present	$C_{4,2}$ Present	
	D_5 Service integration	$C_{5,1}$ None	$C_{5,2}$ Single integration	$C_{5,3}$ Multiple integration
Interaction	D_6 Multimodality	$C_{6,1}$ Unidirectional	$C_{6,2}$ Bidirectional	
	D_7 Interaction classification	$C_{7,1}$ Graphical	$C_{7,2}$ Interactive	
	D_8 Interface personification	$C_{8,1}$ Disembodied	$C_{8,2}$ Embodied	
	D_9 User assistance design	$C_{9,1}$ Reactive assistance	$C_{9,2}$ Proactive assistance	
	D_{10} Number of participants	$C_{10,1}$ Individual human participant	$C_{10,2}$ Two or more human participants	
	D_{11} Additional human support	$C_{11,1}$ No	$C_{11,2}$ Yes	
	D_{12} Front-end user interface channel	$C_{12,1}$ App	$C_{12,2}$ Collaboration and communication tools	$C_{12,3}$ Social media
		$C_{12,4}$ Website	$C_{12,5}$ Multiple	
Context	D_{13} Chatbot role	$C_{13,1}$ Facilitator	$C_{13,2}$ Peer	$C_{13,3}$ Expert
	D_{14} Relation duration	$C_{14,1}$ Short-term relation	$C_{14,2}$ Long-term relation	
	D_{15} Application domain	$C_{15,1}$ E-customer service	$C_{15,2}$ Daily life	$C_{15,3}$ E-commerce
		$C_{15,4}$ E-learning	$C_{15,5}$ Finance	$C_{15,6}$ Work and career
	D_{16} Collaboration goal	$C_{16,1}$ Non goal-oriented	$C_{16,2}$ Goal-oriented	
	D_{17} Motivation for chatbot use	$C_{17,1}$ Productivity	$C_{17,2}$ Entertainment	
		$C_{17,3}$ Social/relational	$C_{17,4}$ Utility	

For B2B customer service Chatbots: The paper “More than FAQ! Chatbot Taxonomy for Business-to-Business Customer Services” (Janssen et al., 2021a) identifies the context-specific design elements and applications prevalent in chatbots deployed for B2B interactions. Accordingly, the underlying meta-characteristic used as basis for the development of the taxonomy comprises “the design elements for B2B customer service chatbots” (Janssen et al., 2021a, p. 178). The taxonomy development process was executed over one conceptual-to-empirical and three empirical-to-conceptual iterations. Thereby, a total of 40 B2B customer service chatbots were analyzed throughout the taxonomy development. The final taxonomy consists of 17 design dimensions and 45 design elements for B2B services chatbots, as detailed in Table 11.

Table 11: Final taxonomy of design elements for B2B customer service chatbots in accordance with Janssen et al. (2021a, p. 182)

Dimensions D_i	Characteristics $C_{i,j}$ (% distribution)		
D_1 Industry classification	$C_{1,1}$ Financial services industry (5%)	$C_{1,2}$ Manufacturing industry (22%)	
	$C_{1,3}$ Marketing industry (10%)	$C_{1,4}$ Software industry (63%)	
D_2 Business integration	$C_{2,1}$ No (68%)	$C_{2,2}$ Yes (32%)	
D_3 Access to business data	$C_{3,1}$ No (90%)	$C_{3,2}$ Yes (10%)	
D_4 Dialogue structure	$C_{4,1}$ Predefined (48%)	$C_{4,2}$ Open (15%)	$C_{4,3}$ Both (37%)
D_5 Data policy	$C_{5,1}$ Not provided (65%)	$C_{5,2}$ Provided (35%)	
D_6 Handoff to human agent	$C_{6,1}$ Not possible (12%)	$C_{6,2}$ Possible (88%)	
D_7 Small talk	$C_{7,1}$ Not possible (80%)	$C_{7,2}$ Possible (20%)	
D_8 Human-like avatar	$C_{8,1}$ No (90%)	$C_{8,2}$ Yes (10%)	
D_9 Content related service	$C_{9,1}$ Content advertisement (70%)	$C_{9,2}$ Content consumption (30%)	
D_{10} Account authentication	$C_{10,1}$ Not required (63%)	$C_{10,2}$ Optional (12%)	$C_{10,3}$ Required (25%)
D_{11} Question personalization	$C_{11,1}$ None (12%)	$C_{11,2}$ FAQ (50%)	
	$C_{11,3}$ Personalized account questions (30%)	$C_{11,4}$ Highly personalized questions (8%)	
D_{12} Customer service orientation	$C_{12,1}$ Knowledge-oriented (53%)	$C_{12,2}$ Task-oriented (47%)	
D_{13} Company information	$C_{13,1}$ No (70%)	$C_{13,2}$ Yes (30%)	
D_{14} Service/product information	$C_{14,1}$ No (15%)	$C_{14,2}$ Yes (85%)	
D_{15} Pricing	$C_{15,1}$ No (80%)	$C_{15,2}$ Yes (20%)	
D_{16} Action request	$C_{16,1}$ Book/show a demo (8%)	$C_{16,2}$ Callback request (32%)	
	$C_{16,3}$ Both (35%)	$C_{16,4}$ None (25%)	
D_{17} Service request	$C_{17,1}$ Support question /ticket (32%)	$C_{17,2}$ Billing details (3%)	$C_{17,3}$ User management (3%)
	$C_{17,17}$ Multiple (10%)	$C_{17,5}$ None (52%)	

Using this taxonomic structure and Ward's hierarchical clustering method (Ward, 1963) to quantitatively determine the archetypal patterns embedded in existing B2B customer service chatbots, three archetypes of chatbots in B2B customer service were created, denoted as “lead generation chatbot,” “aftersales facilitator chatbot,” and “advertising FAQ chatbot” (Janssen et al., 2021a, p. 183).

For user-chatbot relationships with different time horizons: The paper “See You Soon Again, Chatbot? A Design Taxonomy to Characterize User-Chatbot Relationships with Different Time Horizons” (Nissen et al., 2021) presents a taxonomy for the design of domain-specific text-based chatbots with different temporal profiles. The taxonomy development procedure was completed in two conceptual-to-empirical and five empirical-to-conceptual iterations, upon meeting all subjective and objective adopted ending conditions. In the conceptual-to-empirical iterations, taxonomic dimensions and characteristics were conceptually abstracted on the basis of a review of academic articles on design frameworks for chatbots, while in the empirical-to-conceptual iterations, an empirical classification of a total of 120 real-world chatbots was performed. As a result, a final taxonomy composed of 22 design dimensions and 61 time-dependent design characteristics was derived.

Table 12: Final taxonomy of time-dependent design characteristics for chatbots from Nissen et al. (2021, p. 5)

Layer	Perspective	Design Dimensions	Design Characteristics
Chatbot	Temporal Profile	D_1 Time horizon	$C_{1,1}$ Short-term | $C_{1,2}$ Medium-term | $C_{1,3}$ Long-term | $C_{1,4}$ Life-long
		D_2 Frequency of interactions	$C_{2,1}$ One-time only | $C_{2,2}$ Multiple times
		D_3 Duration of interaction	$C_{3,1}$ Short | $C_{3,2}$ Medium | $C_{3,3}$ Long
		D_4 Consecutiveness of interactions	$C_{4,1}$ Unrelated | $C_{4,2}$ Related
	Appearance	D_5 Role	$C_{5,1}$ Expert | $C_{5,2}$ Facilitator | $C_{5,3}$ Peer
		D_6 Primary communication style	$C_{6,1}$ Task-oriented | $C_{6,2}$ Socially-/chat-oriented
		D_7 Avatar representation	$C_{7,1}$ Disembodied | $C_{7,2}$ Embodied
	Intelligence	D_8 Intelligence framework	$C_{8,1}$ Rule-based | $C_{8,2}$ Hybrid | $C_{8,3}$ Artificially intelligent
		D_9 Intelligence quotient	$C_{9,1}$ Rule-based knowledge only | $C_{9,2}$ Text understanding | $C_{9,3}$ Text understanding+
		D_{10} Personality adaptability	$C_{10,1}$ Principal self | $C_{10,2}$ Adaptive self
		D_{11} Socio-emotional behavior	$C_{11,1}$ Not present | $C_{11,2}$ Present
		D_{12} Service integration	$C_{12,1}$ None | $C_{12,2}$ External data | $C_{12,3}$ Media resources | $C_{12,4}$ Multiple
Chatbot and User	Interaction	D_{13} Front-end user interface	$C_{13,1}$ App | $C_{13,2}$ Social media | $C_{13,3}$ Collaboration tools | $C_{13,4}$ Website | $C_{13,5}$ Multiple
		D_{14} Communication modality	$C_{14,1}$ Text only | $C_{14,2}$ Text+voice
		D_{15} Interaction modality	$C_{15,1}$ Graphical | $C_{15,2}$ Interactive
		D_{16} User assistance design	$C_{16,1}$ Reactive | $C_{16,2}$ Proactive | $C_{16,3}$ Reciprocal
		D_{17} Personalization	$C_{17,1}$ Static | $C_{17,2}$ Adaptive
		D_{18} Add. human support	$C_{18,1}$ None | $C_{18,2}$ Yes
		D_{19} Gamification	$C_{19,1}$ Not gamified | $C_{19,2}$ Gamified
User	Context	D_{20} Application domain	$C_{20,1}$ Business | $C_{20,2}$ Healthcare | $C_{20,3}$ Education | $C_{20,4}$ Daily life
		D_{21} Motivation/purpose	$C_{21,1}$ Productivity | $C_{21,2}$ Entertainment | $C_{21,3}$ Utility | $C_{21,4}$ Informational | $C_{21,5}$ Coaching
		D_{22} Collaboration goal	$C_{22,1}$ Non goal-oriented | $C_{22,2}$ Goal-oriented

The main archetypal patterns of chatbots with different time horizons, were determined with the application of the final taxonomic structure and the use of inferential statistics. Thereby, three time-dependent chatbot design archetypes were identified. These were denominated as “ad-hoc supporters,” “temporary assistants” and “persistent companions.” Figure 19 presents a comparative overview of the structural design differences among the identified chatbot archetypes.

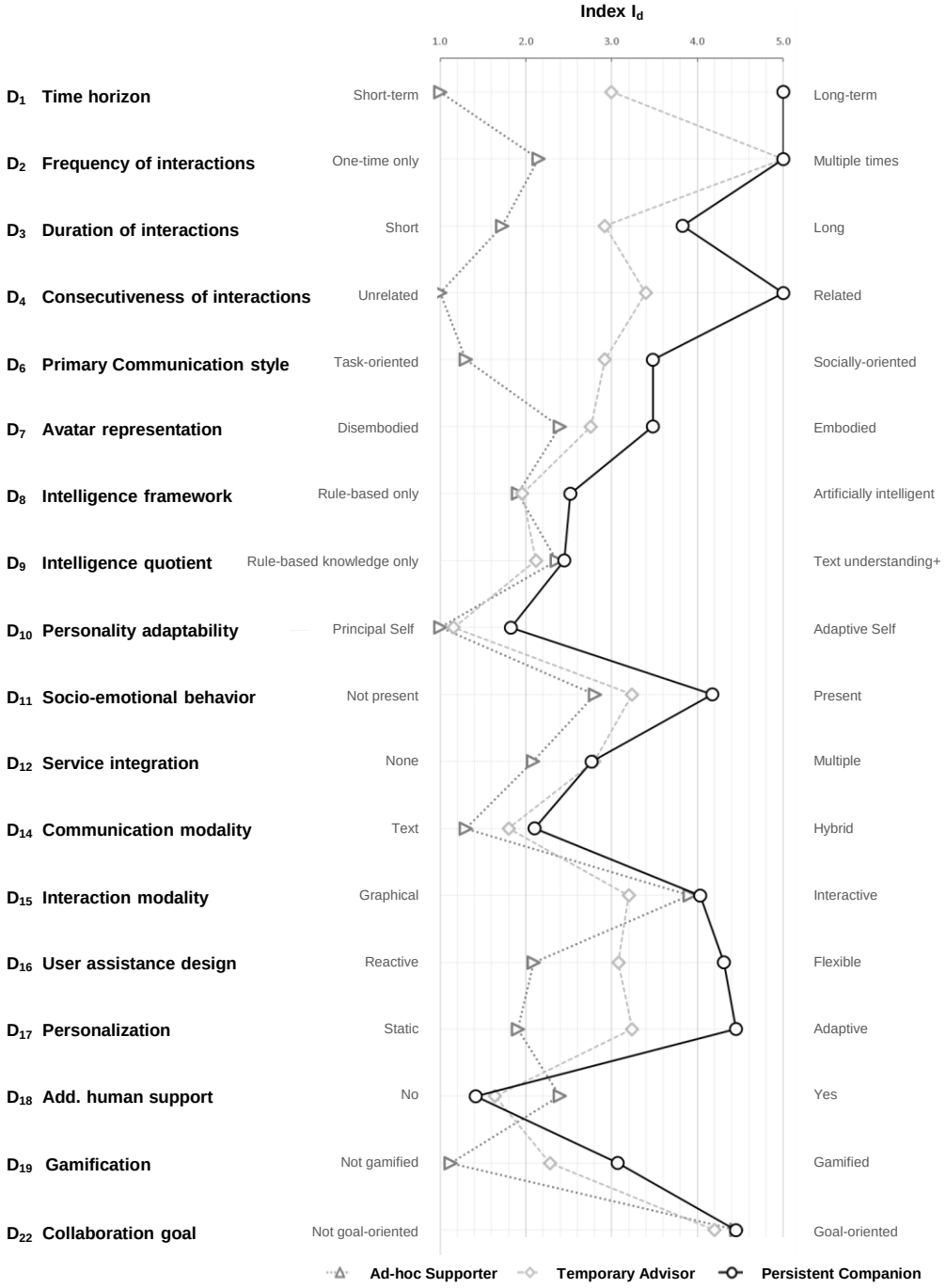

Figure 19: Design differences among time-dependent chatbot archetypes corresponding to Nissen et al. (2021, p. 7)

5.2.2 Adoption and Diffusion of Chatbot Technology in the Financial Industry

The findings presented below are related to the results of the papers “A Mixed Methods Analysis of the Adoption and Diffusion of Chatbot Technology in the German Insurance Sector” (Rodríguez Cardona et al., 2019) and “A Matter of Trust? Examination of Chatbot Usage in Insurance Business” (Rodríguez Cardona et al., 2021a).

The paper “A Mixed Methods Analysis of the Adoption and Diffusion of Chatbot Technology in the German Insurance Sector” (Rodríguez Cardona et al., 2019) analyzes the ambivalent factors influencing the adoption and diffusion of chatbots in the financial services industry. In the manner described in section 5.1, the analysis followed a mixed-methods approach. In the part of the analysis related to the quantitative approach, the “knowledge”, “attitude” and “behavioral intention” of potential users towards insurance chatbots were evaluated by means of a web-based cross sectional survey and a cohort analysis segmented into four generations, i.e., baby boomers, generation X, generation Y, and generation Z (Rodríguez Cardona et al., 2019). The survey results in regard to the awareness of the existence of chatbot technology (i.e., “knowledge”) shown a rising awareness on the part of younger potential users. The analysis of the preferences of potential users with respect to the adoption of insurance chatbots at distinct stages of the insurance advisory process (i.e., “attitude”) indicated an overall preference among potential users for being assisted at early stages of the advisory process by a chatbot. While the survey results relating to the behavioral intention to use insurance chatbots across different service delivery channels (i.e., “behavior”) evidenced a clear predilection on the part of potential chatbot users for interaction with a chatbot when it is embedded within official media (e.g., a corporate website). Overall, the results of the mixed methods analysis of the perception, attitudes, and beliefs of both industry practitioners and potential chatbot users indicated that the factors of “relative advantages” and “IS infrastructure” exert a significant influence on the adoption and diffusion of chatbots in an insurance context. Likewise, with respect to the trade-off between the perceived advantages and the perceived risks, the level of trust in chatbot technology was found in the qualitative analysis to play a significant role. Given the above, the paper “A Matter of Trust? Examination of Chatbot Usage in Insurance Business” (Rodríguez Cardona et al., 2021a) examines the effect of trust and privacy concerns, perceived ease of use and perceived usefulness on the intention to use chatbots in an insurance context. For the analysis, a conceptual structural model was developed to test the eight hypotheses listed in Table 13. These hypotheses were derived from the academic literature on technology acceptance and its notional interrelationship with trust and privacy concerns.

Table 13: Overview of relationships and hypotheses from Rodríguez Cardona et al. (2021a)

H_n	Relationship	Hypothesis
H_1	PEOU→ INT_USE	The perceived ease of use is positively related to the intention to use insurance chatbots.
H_2	PU→ INT_USE	The perceived usefulness is positively related to the intention to use insurance chatbots.
H_3	PEOU→ PU	The perceived ease of use is positively related to the perceived usefulness of insurance chatbots.
H_4	TR→ INT_USE	Trust is positively related to the intention to use insurance chatbots.
H_5	TR → PU	Trust is positively related to the perceived usefulness of insurance chatbots.
H_6	PEOU→ TR	The perceived ease of use is positively related to trust in insurance chatbots.
H_7	PRIV→ TR	Privacy concerns are negatively related to trust in insurance chatbots.
H_8	PRIV→ INT_USE	Privacy concerns are negatively related to the intention to use insurance chatbots.

Note: PEOU: Perceived Ease of Use; EXP: Experience; INT_USE: Intention to Use; PU: Perceived Usefulness; TR: Trust; PRIV: Privacy Concerns

For the conceptualization of the structural model, the trust construct was abstracted in terms of trusting beliefs drawn from Mcknight et al. (2011), Lankton et al. (2015) and Przegalinska et al. (2019). The construct of privacy concerns was characterized in the context of “risks of identity or data theft,” “unauthorized secondary use,” and “information control” (Rodríguez Cardona et al., 2021a, p. 560) in conformity with Featherman et al. (2010) and Dinev et al. (2013). While, the constructs of “perceived ease of use,” “perceived usefulness” and the “intention to use” were taken from the TAM proposed by Davis (1989) (See Section 2.4 for details related to this model). Moreover, the experience with insurance chatbots was incorporated as covariate. The measurement items composing the constructs were operationalized through a cross-sectional survey with a total of 215 respondents. For a detailed description of the survey process and measurement items, refer to the full paper of Rodríguez Cardona et al. (2021a). Before testing the aforementioned hypotheses, the reliability and validity of the measurement model were evaluated and found to be within the optimal threshold values corresponding to the statistical tests used.

Table 14: Measurement model statistics in conformity with Rodríguez Cardona et al. (2021a, p. 561)

Construct	C.R.	C.A.	AVE	1	2	3	4	5	6
PEOU	0.946	0.924	0.814	0.902***					
EXP	1.000	1.000	1.000	-0.011	1.000***				
INT_USE	0.846	0.727	0.648	0.323	-0.095	0.805***			
PU	0.916	0.890	0.647	0.414	-0.044	0.663	0.804***		
PRIV	0.941	0.917	0.800	-0.159	0.030	-0.279	-0.293	0.895***	
TR	0.898	0.857	0.639	0.400	-0,038	0.489	0.481	-0.454	0.799***

Note: PEOU: Perceived Ease of Use; EXP: Experience; INT_USE: Intention to Use; PU: Perceived Usefulness; TR: Trust; PRIV: Privacy Concerns C.R. = Composite Reliability, ICR ($\rho \geq 0.7$); AVE (ξi) ≥ 0.5; C.A. = Cronbach’s Alpha; square root values of AVE are in shaded diagonal cells.

Specifically, the item reliability and composite reliability were examined in conformity with Hair et al. (2016). The convergent validity of the model was assessed through the estimation of the average variance extracted (Fornell & Larcker, 1981), while the discriminant validity of the model was evaluated by assessing the cross-loadings in conjunction with the estimation of the heterotrait monotrait ratio of correlations and the Fornell-Larcker criterion (Henseler et

al., 2015). As well, the structural model was tested for multicollinearity and common method bias using the variance inflation factor (Chang et al., 2010).

Table 15: Estimated outer model loadings and cross-loadings according to Rodríguez Cardona et al. (2021a, p. 561)

Items	INT_USE	PEOU	PU	PRIV	TR	EXP
INT_USE1	0.740***	0.225	0.499	-0.249	0.371	-0.076
INT_USE2	0.882***	0.317	0.636	-0.172	0.417	-0.086
INT_USE3	0.786***	0.228	0.444	-0.273	0.394	-0.066
PEOU1	0.357	0.891***	0.405	-0.148	0.376	0.028
PEOU2	0.268	0.893***	0.352	-0.087	0.334	-0.045
PEOU3	0.244	0.925***	0.379	-0.145	0.371	-0.028
PEOU4	0.288	0.899***	0.351	-0.191	0.358	-0.001
PU1	0.557	0.342	0.789***	-0.182	0.345	-0.056
PU2	0.430	0.298	0.780***	-0.164	0.345	-0.026
PU3	0.503	0.301	0.814***	-0.272	0.425	-0.019
PU4	0.544	0.326	0.839***	-0.278	0.441	-0.024
PU5	0.563	0.306	0.756***	-0.187	0.348	-0.034
PU6	0.583	0.410	0.843***	-0.311	0.411	-0.051
PRIV1	-0.245	-0.130	-0.249	0.883***	-0.422	0.006
PRIV2	-0.267	-0.150	-0.261	0.873***	-0.423	0.056
PRIV3	-0.196	-0.146	-0.239	0.907***	-0.347	0.027
PRIV4	-0.279	-0.144	-0.292	0.914***	-0.420	0.017
TR1	0.356	0.312	0.316	-0.236	0.765***	-0.060
TR2	0.387	0.244	0.377	-0.424	0.820***	-0.055
TR3	0.374	0.349	0.394	-0.365	0.815***	-0.054
TR4	0.403	0.356	0.408	-0.368	0.723***	-0.023
TR5	0.424	0.333	0.413	-0.399	0.867***	0.054
EXP3	-0.095	-0.011	-0.044	0.030	-0.038	1.000***

Note: PEOU: Perceived Ease of Use; EXP: Experience; INT_USE: Intention to Use; PU: Perceived Usefulness; TR: Trust; PRIV: Privacy Concerns; * p < 0.05, **p < 0.01, ***p < 0.001

The partial least squares results obtained for the structural model are depicted in Figure 20. The practical significance of the structural model was determined through the assessment of the coefficients of determination (R^2) of the endogenous constructs (Henseler et al., 2015) with the outcomes indicated in Figure 20.

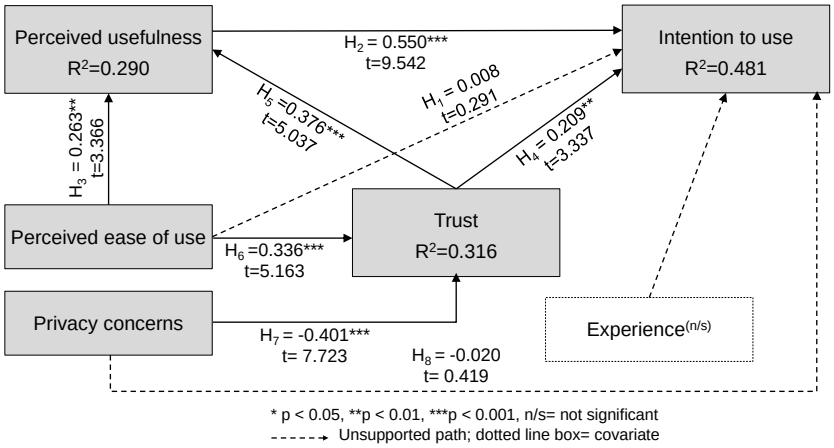

Figure 20: Effects on the intention to use chatbots in an insurance context in line with Rodríguez Cardona et al. (2021a, p. 562)

The effect size of the constructs, as a measure to represent the practical significance of the exogenous latent variables on the endogenous latent variables, was determined following Cohen (1988). In view of the foregoing, the results of the analysis supported six of eight hypotheses as detailed in Table 16.

Table 16: Measurement model statistics in line with Rodríguez Cardona et al. (2021a, p. 562)

H_n	Relationship	β	T-value	P-value	f^2	Results
H_1	PEOU→ INT_USE	0.008	0.291	0.771	0.000	Not supported
H_2	PU→ INT_USE	0.550	9.542	0.000	0.409	Supported
H_3	PEOU→ PU	0.263	3.366	0.001	0.082	Supported
H_4	TR→ INT_USE	0.209	3.337	0.001	0.052	Supported
H_5	TR → PU	0.376	5.037	0.000	0.167	Supported
H_6	PEOU→ TR	0.336	5.163	0.000	0.161	Supported
H_7	PRIV→ TR	-0.401	7.723	0.000	0.229	Supported
H_8	PRIV→ INT_USE	-0.020	0.419	0.675	0.001	Not supported

Note: PEOU: Perceived Ease of Use; EXP: Experience; INT_USE: Intention to Use; PU: Perceived Usefulness; TR: Trust; PRIV: Privacy Concerns; H= Hypothesis; β= path coefficient; Cohen's f^2-statistics = [R^2incl. - R^2 excl.] / [1-R^2incl.] (1988); $f^2 \geq$ 0.02, 0.15 and 0.35 correspond to small, medium, and large effects.

Thereby, the results indicated that the perceived usefulness has a greater positive influence than the perceived ease of use and the perceived trust on the intention to interact with chatbots in an insurance context. Conversely, privacy concerns were found to exert a negative significant effect on trust, although a negative significant effect on the intention to use insurance chatbots was not found. Moreover, no significant effect was determined between the experience with insurance chatbots (covariate) and the intention to use them, neither the experience was found to exert a moderating effect between trust and the intention to use (i.e., t-statistic (|O/STDEV| = 1.845; p-value = 0.065) (Rodríguez Cardona et al., 2021a, p. 562).

5.2.3 User-Oriented Implementation of Chatbots

The paper "How to Make Chatbots Productive – A User-Oriented Implementation Framework" (Janssen et al., 2022) presents a framework for the design and implementation of chatbots oriented from a target user characteristics and requirements angle. The framework is composed of 101 implementation questions drawn from the HCI literature on user-centered design and a qualitative content analysis of primary data collected through semi-structured interviews. In terms of this analysis relevant context, causal, and intervening conditions, as well as routine or strategic actions and/or interactions, were determined. The identified implementation conditions are depicted in Figure 21 and outlined in summary form below.

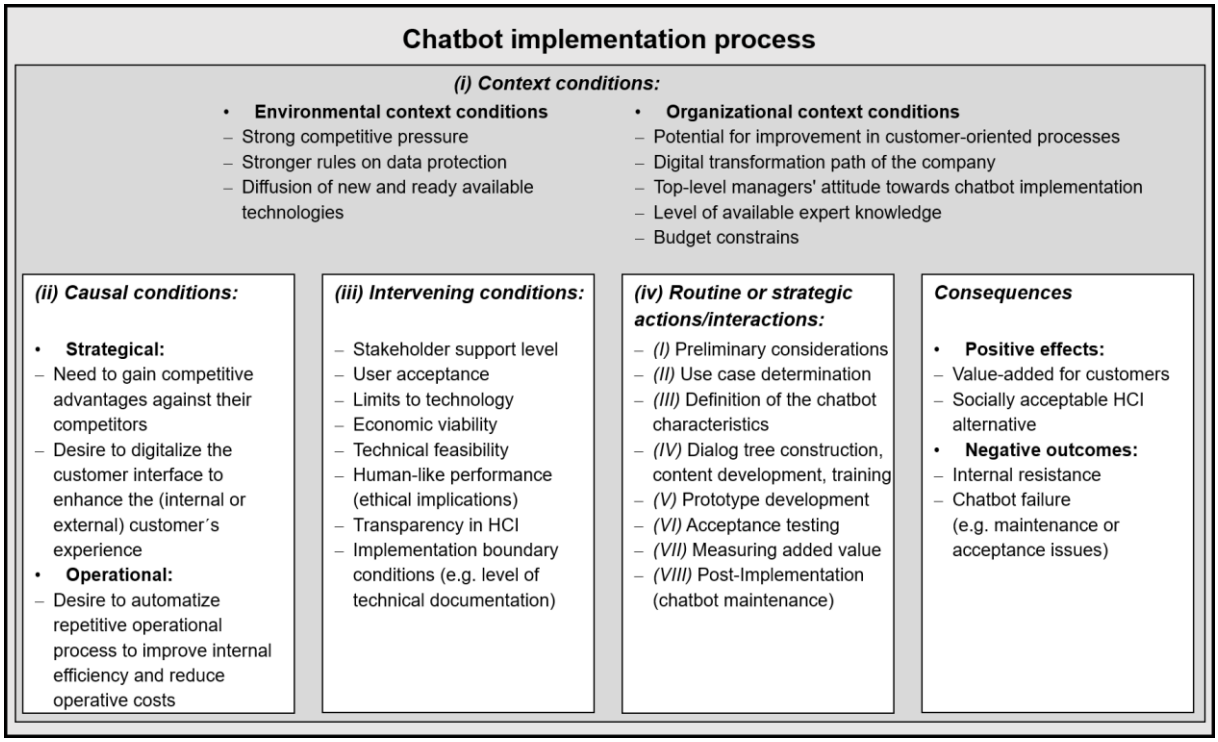

Figure 21: Relevant chatbot implementation process conditions corresponding to Janssen et al. (2022, p. 16)

Context conditions: The results achieved through the analysis indicated that the conditions under which the chatbot implementation process take place can be divided into two sub-contexts: (i) environmental and (ii) organizational. This differentiation is important given that it offers a direct indication of the rationale behind the chatbot implementation depending on the power that the company has to influence the context conditions at each level of abstraction. In line with this, at the environmental level, within which companies have no power to control the context conditions. These include the restrictiveness of the legislation on data protection, the level of proliferation of technological innovations, and the specific pressure from market forces in a sector. Regarding the influence of the latter two environmental context conditions, the analyzed data also suggest that the implementation of chatbots as innovations in customer service is not only driven by the potential positive effects related to this technology (e.g., value-added for customers). But also that to a large extent, the implementation of chatbots in organizations mirrors a reflex response towards the strong competitive pressure that comes with the rapid diffusion of new technologies across industries (See e.g., Schuelke-Leech, 2018). Conversely, in the organizational sub-context, the empirical findings gained indicate that the level of managerial support, budget, and expert knowledge constraints are key aspects to shape the strategic response of the company to the prevailing environmental context conditions.

Causal conditions: Regardless of the type of industry and company size, the incorporation of innovations in the form of chatbots in the business strategy of the analyzed companies was found to meet three primary purposes that act as causal conditions: (i) the leverage of new technologies to gain advantages over their competitors, (ii) the digitalization of the customer interface to enhance the internal or external customer experience, and (iii) the automation of repetitive operational processes to improve internal efficiency and reduce operative costs.

Intervening conditions: In the context of the performed analysis, the identified intervening conditions illustrate the aspects that enable or limit the drivers behind a chatbot implementation. Consistent with the analysis, these include aspects such as the inherent limits of the technology and its interplay with the technical expectations of the internal and external customers, as well as overall user acceptance, inter alia. Primarily, the results highlighted the importance of intervening conditions, such as the stakeholder support level, which should properly be ensured during the entire implementation process. To that end, seven parties were identified as key stakeholders that should be involved besides the implementation team throughout the chatbot implementation process: (i) top-level managers, (ii) legal departments (or external consulting firms on information technology law), (iii) IT security experts (intern or outsourced, depending on the level of available expert knowledge within the company), (iv) works council, (v) corporate communications department, (vi) process owner (and technical experts) of the specific application case, and (vi) employees whose activities are planned to be digitalized by means of the chatbot.

Routine or strategic actions and/or interactions: Consistent with the insights gained from the analysis of the primary qualitative data, the process of implementing a chatbot is archetypically accomplished through eight implementation phases that have been designated as: (I) “preliminary considerations” (e.g., identification of repetitive operational processes and feasible digital technologies to redesign them), (II) “use case determination” (e.g., specification of use cases relevant to the organization, the project stakeholders and the stakeholder engagement plan), (III) “definition of the chatbot characteristics” (e.g., determination of the chatbot design elements), (IV) “dialogue tree construction, content development, training” (e.g., process mapping and of the dialogue tree design), (V) “prototype development” (e.g., proof of concept testing and improvement of the dialogue tree), (VI) “acceptance testing” (e.g., acceptance testing at internal and target group level), (VII) “measuring added value” (e.g., performance measurement through key performance indicators), and (VIII) “post-implementation” (e.g., chatbot optimization and maintenance) (Janssen et al., 2022, p. 4). The aforementioned implementation phases are illustrated on a sequential basis in Figure 22.

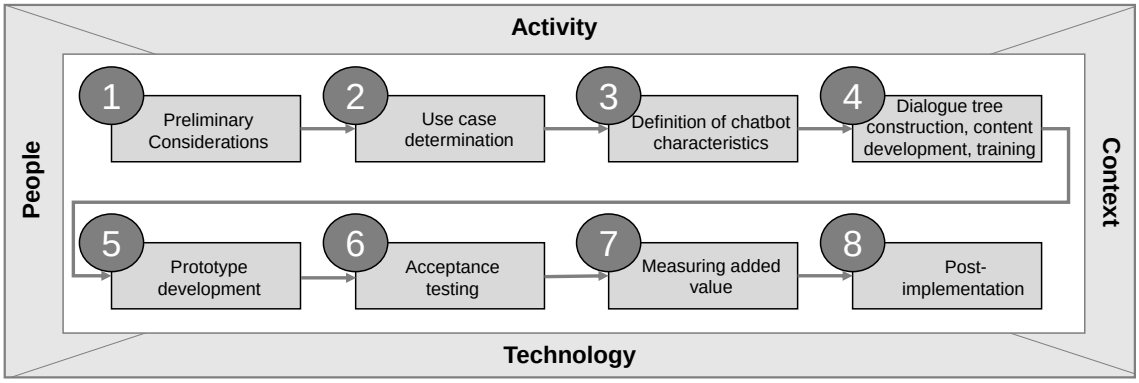

Figure 22: Eight-step chatbot implementation framework structure in accordance with Janssen et al. (2022, p. 6)

Since the interactionism of the above conditions is essential to consider when implementing chatbots, these conditions in combination with empirical insights drawn from the scientific literature were used as underlying basis for the determination of the implementation questions underpinning the framework. Furthermore, the identified implementation phases and the people, activity, context, and technology (PACT) model of Benyon (2014; 2019) were used as the structural axes to achieve, throughout the entire design and implementation of chatbots, a user-oriented perspective (as shown in Figure 23).

People (P)	Activity (A)	Context (C)	Technology (T)
(I) Preliminary considerations			
(IP1) What are the business processes in which the (internal or external) users desire (need) to receive more (better) support to improve the customer/user value perception? **(IP2)** What type of communication technologies do the users employ on a regular basis?	**(IA1)** What are the most repetitive/ monotonous activities from users' viewpoint? **(IA2)** What are the characteristics of the previously identified activities? **(IA3)** What type of activities should be handled by a human employee to achieve the best outcome for the users?	**(IC1)** In which area or business context do users have most (special) difficulties/problems (e.g., customer service context)? **(IC2)** In which task fields can a chatbot add value to the company? **(IC3)** In which cases can a chatbot relieve employees? **(IC4)** Do employees need to be trained in handling chatbots?	**(IT1)** Considering the value proposition of the organization, is a chatbot the appropriate technology to improve the customer/user value perception (e.g., by overcoming previously identified difficulties/problems)? **(IT2)** Which technology concerns should be considered (i.e., regulations and ethical and security issues)?
(II) Use case determination			
(IIP1) Who are the end-users (i.e., target group)? **(IIP2)** How are the target groups segmented? **(IIP3)** What type of communication technologies do target groups use on a regular basis? **(IIP4)** What would be the end-users' main extrinsic motivation for using a chatbot? **(IIP5)** Which target group segments perceive added value in the potential use of a chatbot? **(IIP6)** What availability does the target group look for (i.e., 24/7 service chatbot)?	**(IIA1)** What are the collaborative requirements of the activity to be digitalized? **(IIA2)** What is the users' desired outcome? **(IIA3)** Do users need (desire) to receive additional human support to accomplish their activity? (Handover) **(IIA4)** Does the activity require historical user information to be accomplished?	**(IIC1)** On which communication platforms is the target group active? **(IIC2)** What is the application domain? **(IIC3)** Is the chatbot intended to be used for an internal or external context? **(IIC4)** Is customer data necessary to optimally support the user (i.e., login, 2-factor authentication)? **(IIC5)** Which device does the target group use (i.e., Smartphone or tablet)? **(IIC6)** Should the method of communication (i.e., e-mail, web interface) also attract potential customers? **(IIC7)** Where are possible or existing touch points with customers?	**(IIT1)** How is the data situation (i.e., quality of the process/technical documentation)? **(IIT2)** Through which communication channels have users been reached so far? **(IIT3)** What type of platform integration is needed? **(IIT4)** How does a typical chatbot interface look like in the application domain? **(IIT5)** Which server fulfils the requirements (cloud or on-premises)? **(IIT6)** In-house development or outsourcing? **(IIT7)** Which provider fulfils the technical requirements?
(III) Definition of chatbot characteristics			
(IIIP1) How many users can be reached through the chatbot? **(IIIP2)** Self-evolution: What features should the chatbot have to produce the users' desired outcome? **(IIIP3)** To what degree is the behavior of using the chatbot self-motivated? **(IIIP4)** Does the user need a tutorial on how to use the chatbot? **(IIP5)** How can a chatbot measure user satisfaction? **(IIP6)** Is the user experience improved by integrating gimmicks?	**(IIIA1)** How do the users formulate their requests? **(IIIA2)** Is a chatbot-driven or user-driven dialogue preferred? **(IIIA3)** What type of objectives do the users attempt to meet by using the chatbot? **(IIIA4)** Is the intent to use the chatbot more goal-oriented or non-goal-oriented? **(IIIA5)** How did a typical conversation between a customer and an employee look like before the chatbot? **(IIIA6)** What should the chatbot be able to do? What should the chatbot be unable to do for now? (core function) **(IIIA7)** What activities are measurable after implementation?	**(IIIC1)** In what way (text/speech/video) do users wish to communicate? **(IIIC2)** What type of context-awareness is needed by the chatbot? **(IIIC3)** How should the chatbot react if it cannot respond? **(IIIC4)** Is the explicit emotional context of the users handled properly? (i.e., stressed or frustrated users)	**(IIIT1)** Does the company have any already existing chat interfaces that can be adapted or should the company start from scratch? **(IIIT2)** To what extent is it desired for the chatbot to present human-like features (e.g., avatar, personality)? **(IIIT3)** Which interfaces to further knowledge bases are required to provide the information requested by the users? **(IIIT4)** How should the UI look from a user viewpoint? **(IIIT5)** Are the users' desired chatbot features within the approved company budget? **(IIIT6)** Is the chatbot expected to have good speech recognition/NLP? **(IIIT7)** Does the chatbot need an interface for pictures? **(IIIT8)** Are any licenses/ permissions for access required? **(IIIT9)** Are there any data protection restrictions? **(IIIT10)** Does the chatbot need artificial intelligence?
(IV) Dialogue tree construction and content development			
(IVP1) In which language specifications do the users wish to communicate with? **(IVP2)** What type of characteristics should the chatbot's responses have from the user perspective (e.g., long/short answers)? **(IVP3)** Does the target group use multiple languages? Should the chatbot work with translation tools? **(IVP4)** Do answers include emojis, visualizations, and/or text? **(IVP5)** Will it be a B2B or B2C chatbot (technical or colloquial)?	**(IVA1)** Do the users prefer to use a pre-configured selection menu or would they prefer to formulate their own questions/requests? **(IVA2)** What do sample texts look like? **(IVA3)** What answers do users expect? **(IVA4)** Are there previous dialogue trees that can be used as a base? **(IVA5)** Do multiple formulations lead to the same result?	**(IVC1)** Does the chatbot match the intended context use and user's perceptions? (Exp15) **(IVC2)** How should the conversation start from the user's perspective for it to sound more human-like? **(IVC3)** What chatbot personality traits do the users expect? **(IVC4)** How should the chatbot react if it is asked something out of context (i.e., marriage proposal)?	**(IVT1)** Which data are usable? **(IVT2)** Do these data still need to be strongly classified? **(IVT3)** Are there enough data or should data be purchased? **(IVT4)** How much training does a chatbot need to obtain enough data without overloading?
(V) Prototype development			
(VI) Acceptance testing			
(VIP1) Are the expectations of the end-users fulfilled in the test phase? **(VIP2)** Does users perceive the chatbot as a serious communicator?	**(VIA1)** What questions do the users have? **(VIA2)** Which questions can the chatbot not answer yet?		**(VIT1)** From an NLP perspective, does the chatbot interact as the users expected?
(VII) Measuring added value			
(VIIP1) What are the usage criteria for the users in the end?/What perceived value does the chatbot have to the user? **(VIIP2)** How often do the users leave the chatbot or stop writing and why?	**(VIIA1)** What is the average duration of a chat? **(VIIA2)** How profound is the response to the inquiry? **(VIIA3)** How often is the conversation surrendered to a human?	**(VIIC1)** Does the chatbot accomplish its primary task?	**(VIIT1)** How often is the chatbot used as an offer? **(VIIT2)** Does the chatbot do what it is supposed to do?
(VIII) Post-implementation			
(VIIIP1) Is the target group still reached through the chatbot?	**(VIIIA1)** Does the chatbot still represent the activity requested by the users? **(VIIIA2)** Are there any conversational flows that led to a failure because the flow was not modelled?	**(VIIIC1)** Does the context in which the chatbot is used still fit the chatbot? **(VIIIC2)** Does the chatbot fit the company? **(VIIIC3)** Is the chatbot affected by legal changes?	**(VIIIT1)** How can the answer given by a human to a question that the chatbot cannot solve be built into the chatbot? **(VIIIT2)** What newfound technologies can be included (e.g., updates)?

Figure 23: User-oriented chatbot implementation framework from Janssen et al. (2022, p. 8)

6 Overall Discussion, Implications, Limitations, Generalizations and Further Research

In the last decade, most domains of societal life and economic sectors have been impacted by the rapid global diffusion of digital innovations enabled by disruptive technologies (Van Veldhoven & Vanthienen, 2022). At the business level, the proliferation of new and readily available technological possibilities has prompted a significant shift in the needs and expectations of customers (Werth et al., 2020) and contributed to increasing the intensity of competition across major industrial and commercial sectors (Skog et al., 2018; Verhoef et al., 2021). To remain competitive in the face of a growing digital economy, incumbent companies in traditional sectors can harness the power of new technological solutions through the implementation of digital transformation strategies. However, the transformative approach, as well as the scope of the strategic changes and innovation challenges of the enforceable digital strategies, differ on the basis of the context and the sector in which these strategies are intended to be implemented. In view of the foregoing aspects, the objective of this cumulative dissertation is to contribute to the field of digital transformation with a particular focus on financial services. To this end, in the three main thematic chapters of the dissertation (i.e., Chapters 3, 4, and 5), a set of diverse peer-reviewed scientific articles are discussed. These scientific articles aimed at advancing the understanding of the underlying role of innovation in the digital transformation concerning how financial service providers capture, generate, and deliver business value. A critical appraisal of the contributions and limitations of the scientific articles comprising this dissertation is presented below. Likewise, a set of potential directions for further RDs related to the challenges and limitations identified per thematic chapter is proposed, and further synthesized in Table 17.

Chapter 3 presents the results of two scientific articles focused on the examination of the underlying factors, implications, and challenges surrounding the integration of digital innovations and transformation strategies within traditional financial institutions. The analysis of the macroeconomic and sector-specific influencing factors underlying the digital transformation in financial services constitutes the starting point of the research outlined in this dissertation. Thereby, the paper of Werth et al. (2020) provides a holistic perspective on the influencing factors at play in the digital transformation of the insurance and banking sectors by taking the macroeconomic environment and the structural differences between these two sectors into account. The presented research suggests that while both sectors share common political, economic, social, and technological challenges, there are differences between the insurance and banking sectors with regard to the scope and speed at which the digital transformation process unfolds in each sector. This is largely due to discrepancies in the degree of change in customer expectations between sectors. Accordingly, further empirical

research can examine the interrelationship between digital servitization and the bargaining power of buyers through a cross-sectoral and cross-national assessment which can be addressed through a mixed-methods approach **(RD 3.1)**.

Furthermore, the research presented in Chapter 3 contributes to gaining deeper insights into the background, changes, and challenges of the transition in the structure of employees' tasks and responsibilities by examining the ambivalent impact of the integration of digital innovations within determined primary and secondary business processes. In this regard, the paper of Eden et al. (2022) contributes to the holistic understanding of the impact of implementing front-office technological innovations in financial services to support the advisory customer relationship. An important finding of this study is the identification of the degree of back-office integration as a critical factor limiting the implementation of technological innovations at the front-office level. In view of this aspect, through case study research, future investigations can explore (See Yin, 2018; Tight, 2022) the possibilities, risks, and challenges related to front- to back-office integration strategies in financial services **(RD 3.2)**. In this respect, the integration of agile ways of working within traditional organizational structures offers the potential to add transformative value to the back-office innovation processes of financial services companies. Nonetheless, this way of working at scale has not been deeply investigated in current academic literature (Kraus et al., 2022). Accordingly, another important line of research is the examination of different implementation paths of agile work approaches in financial services through the lenses of stakeholders directly participating in the implementation processes of agile environments **(RD 3.3)**. Continuing on this line, several potential negative spillover effects should also be further examined, such as issues related to the level of occupational identity **(RD 3.4)** and work stress among employees **(RD 3.5)**, as well as potential team and governance issues arising from changes in traditional lines of authority due to the implementation of new paradigms such as agile work within traditional organizational structures **(RD 3.6)**. The investigation related to the foregoing research directions, could be undertaken by means of exploratory or longitudinal case study research (See Yin, 2018; Tight, 2022).

Chapter 4 presents the results of three scientific articles focused on the structural transformation of the financial sector that is intrinsically linked to the emergence of FinTech business models and their success, whereby the papers of Roeder et al. (2018), Werth et al. (2019), and Werth et al. (2023) structure the extant interdisciplinary knowledge on FinTech success and provide a foundation for theory development. Practitioners can use the identified potential success factors as guiding principles for the strategic management of resources and capabilities. However, since the papers presented in this chapter to some extent assume a static nature in the criticality of the factors identified, to maximize their practical use, future

research can analyze the dynamism of the criticality of these factors over different stages of the life cycle of each FinTech business model archetype **(RD 4.1)**. Additionally, to contribute to the systematization of the progressive integration of the potential success factors identified for FinTech, future research efforts can be focused on the development of frameworks such as management-oriented maturity models to facilitate the practical assessment of the maturity level of the identified potential success factors within FinTech ventures **(RD 4.2)** (See Pöppelbuß et al., 2011; Mettler & Ballester, 2021).

Chapter 5 describes the results of six papers related to the overall digitalization of interaction and communication channels enhanced by digital innovations at the customer interface. By means of the integration of readily available technologies, incumbent companies can digitally transform their traditional go-to-market strategies (Riasanow et al., 2018). In the specific case of the financial services sector, the implementation of technological innovations in the fields of natural language processing and machine learning, such as chatbots, have the potential to play an essential role in the digital transformation of the customer experience. To contribute towards generating a solid knowledge base to support the design of chatbots in accordance with the context and complexity of the digital transformation required in the financial services industry, a taxonomy of components for the design of domain-specific chatbots, together with a taxonomy for B2B customer services, and a taxonomy for the design of user-chatbot relationships for different time horizons are proposed in Janssen et al. (2020), Janssen et al. (2021a), and Nissen et al. (2021), respectively. In addition, a mixed methods analysis of the socio-technical factors underlying the potential use of chatbots in insurance is presented in Rodríguez Cardona et al. (2019). Through this analysis, the knowledge, and affective and behavioral factors influencing the decision to adopt insurance chatbots were determined at an individual and organizational level of analysis. This in turn led to the identification of the notion of trust as a key challenge for the adoption success of chatbot technology in the financial sector. In this respect, a PLS-SEM analysis on the intention to use and interact with chatbots in insurance is presented in Rodríguez Cardona et al. (2021a) which further compares the effect of trust and privacy concerns against key technology acceptance variables. The aforementioned research identifies the challenge of prioritizing a user-oriented design and implementation of chatbots to improve their potential use. Thereby, a framework to guide the user-oriented implementation of chatbots is introduced by Janssen et al. (2022) to help companies identify what the end-user wants from the outset and, based on this, develop the appropriate use case for it. By embedding the characteristics and preferences of future users across four PACT elements, the framework contributes to laying the foundation for the deployment of chatbots in a user-oriented rather than a standard technology-driven design approach. This approach is essential to avoid the implementation of chatbots in organizations

becoming a reflex response to the existence of a strong competitive pressure to innovate and, as a result, the influence of mimetic isomorphism on digital innovation projects emerges as a line of investigation that should be analyzed in greater detail **(RD 5.1)** (See e.g., Sakib, 2020; Ukobitz & Faullant, 2022).

The three taxonomies of design elements, the adoption model, and the user-oriented implementation framework for chatbots presented in Chapter 5 not only advance the theoretical knowledge on the design, adoption, and implementation of chatbots but also provide practical guidance for practitioners to facilitate the implementation of digital approaches based on the integration of chatbots, and the structural and functional development of domain-specific chatbots, as well as chatbots focused on the B2B market or targeting different temporal profiles.

Moreover, the prescriptive knowledge provided by the research presented in Chapter 5 can support not only traditional financial service providers but also FinTech ventures and practitioners from other fields and service segments, to expand the scope of their digital strategies oriented towards transforming the mechanisms through which they interact with and deliver value to their customers using a B2B focus. This is especially valuable given that the empirical evidence provided by the results presented in Chapter 4 indicates that not only B2B customers play a critical role in the sales revenue of financial services providers but also that a CSF for FinTech ventures to improve their market position requires a shift in their business strategies from a business-to-customer towards a B2B marketing approach (See Werth et al., 2019). Considering the above, the design insights provided by Janssen et al. (2021a) and Nissen et al. (2021) can be extended to develop a taxonomy of temporality traits for B2B sales chatbots in the financial sector **(RD 5.2)**.

By consolidating scattered theoretical and empirical knowledge on the technical, temporal, and context-dependent aspects of chatbots and FinTech success, the taxonomies proposed in this dissertation, in conjunction with the archetypes and potential success factors derived from them, offer integrative frameworks that contribute to future research on FinTech venture success and the integration of chatbots as tools to enable digital interaction and innovation in customer services. Overall, the accumulated knowledge on the digital transformation issues analyzed in this work can be transferred to different application fields and industries. In particular, the empirical knowledge gained regarding the implementation of digital transformation strategies and the systematic integration of digital innovations, as well as the role of social constructs such as trust and privacy concerns, can be transferred to other highly regulated industries (e.g., the healthcare and energy sectors) to leverage their digital transformation initiatives.

Table 17: Overview of directions for further research

Research Topic	Directions for Further Research (RDs)	Prospective Methodological Approach
Chapter 3: Digital business transformation in financial services	RD 3.1: Cross-sectoral and/or cross-national assessment of the relationship between digital servitization and buyer bargaining power	Mixed methods research (qualitative interviews/quantitative survey with potential customers)
	RD 3.2: Front- to back-office integration strategies: possibilities, risks, and challenges	Case study research
	RD 3.3 Examination of different implementation paths of agile work in financial services	Exploratory or longitudinal case study research
	RD 3.4 The role of occupational identity in the implementation of agile approaches	Exploratory or longitudinal case study research
	RD 3.5: The impacts of the use of agile approaches on the level of work stress among employees.	Exploratory case study research / Qualitative interviews with stakeholders
	RD 3.6: Team and governance issues arising from new lines of authority in agile implementation projects.	Exploratory case study research / Qualitative interviews with stakeholders
Chapter 4: Digital business model innovation in financial services	RD 4.1: Examination of the levels of the criticality of FinTech success factors over different FinTech archetypes and life cycles.	Qualitative interviews with experts
	RD 4.2: Maturity measurement of potential success factors for FinTech.	Maturity model development
Chapter 5: Digital interaction and service innovation	RD 5.1: Examination of the influence of mimetic isomorphism on digital innovation projects in financial services.	Structural equation modeling
	RD 5.2: Taxonomy of temporality traits in B2B chatbots for the financial sector.	Taxonomy development

7 Conclusions

The rapid pace of change inherent to the global digital transformation exerts pressure on financial service providers to streamline their core business processes and respond more dynamically to changes in the business environment. To be able to cope with the disruptive effects posed by the digital era in a sustainable manner, incumbent financial services companies must go far beyond the implementation of short- to medium-term reactive measures and, through the adoption of digital innovations, catalyze the structural change that has occurred so far as a means to fundamentally transform how they capture, create, and deliver business value.

Given these aspects, this dissertation provides a cumulative synthesis of a set of peer-reviewed scientific articles that are aimed towards advancing the holistic understanding of the value of innovation in the digital transformation of business models in the financial services sector, and of the optimization of existing customer communication channels in light of the strategic integration of digital innovations at the business and process levels. Chapter 3 discusses scientific articles that examine the phenomenon of digital transformation in the financial sector concerning its driving forces, impact, potential opportunities, and challenges. In this chapter, two multiple case analyses are illustrated, the first of which examines the primary underlying macroeconomic and sector-specific factors driving the digital transformation in the financial services sector. The second multiple case analysis assesses the ambivalent impact of the digital transformation of the financial sector driven by the integration of business and process innovations. Subsequently, in Chapter 4, the business model components and the strategic, operational, technological, economic, environmental, and user factors that are relevant to the success of FinTech ventures are empirically identified. Furthermore, in Chapter 5, three taxonomies of design elements, an adoption model, and a user-oriented implementation framework for chatbots are presented and discussed. Practitioners can use the practical descriptions provided as strategic roadmaps that can be applied both within the financial services industry and in other highly regulated environments.

References

Agarwal, G.K., Simonsson, J., Magnusson, M., Hald, K.S., & Johanson, A. (2022). Value-capture in digital servitization. *Journal of Manufacturing Technology Management*, *33*(5), 986–1004.

Aguilar, F. (1967). Scanning the business environment. New York: Macmillan.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179–211.

Alaassar, A., Mention, A. L., & Aas, T. H. (2023). Facilitating innovation in FinTech: A review and research agenda. *Review of Managerial Science*, *17*, 33–66.

Albort-Morant, G., Sanchís-Pedregosa, C., & Paredes Paredes, J. R. (2022). Online banking adoption in Spanish cities and towns. Finding differences through TAM application. *Economic Research*, *35*(1), 854–872.

Albrecher, H., Bommier, A., Filipović, D., Koch-Medina, P., Loisel, S., & Schmeiser, H. (2019). Insurance: models, digitalization, and data science. *European Actuarial Journal*, *9*(2), 349–360.

Alkhamery, N., Zainol, F. A., & Al-Nashmi, M. (2021). The role of dynamic capabilities in reconfiguring operational capabilities for digital business transformation. *The Journal of Management Theory and Practice (JMTP)*, *2*(1), 1–8.

AlNuaimi, B. K., Singh, S. K., Ren, S., Budhwar, P., & Vorobyev, D. (2022). Mastering digital transformation: The nexus between leadership, agility, and digital strategy. *Journal of Business Research*, *145*, 636–648.

Alt, R., Beck, R., & Smits, M. T. (2018). FinTech and the transformation of the financial industry. *Electronic markets*, *28*(3), 235–243.

Alter, S. (2013). Work system theory: Overview of core concepts, extensions, and challenges for the future. *Journal of the Association for Information Systems*, *14*(2), 72–21.

Alter, S. (2022a). A framework for describing theoretical perspectives: Overview and application to the work system perspective. In: *Proceedings of the 55th Hawaii International Conference on System Sciences (HICSS),* HI, USA.

Alter, S. (2022b). Digital transformation progress model for supporting co-creation during a digital transformation initiative. In: Elbanna, A., McLoughlin, S., Dwivedi, Y.K., Donnellan, B., & Wastell, D. (Eds.) Co-creating for context in the transfer and diffusion of IT. TDIT 2022. IFIP Advances in Information and Communication Technology: Vol. 60. Springer, Cham. https://doi.org/10.1007/978-3-031-17968-6_4

Amankwah-Amoah, J., Khan, Z., Wood, G., & Knight, G. (2021). COVID-19 and digitalization: The great acceleration. *Journal of Business Research*, *136*, 602–611.

Anifa, M., Ramakrishnan, S., Joghee, S., Kabiraj, S., & Bishnoi, M. M. (2022). Fintech innovations in the financial service industry. *Journal of Risk and Financial Management*, *15*(287), 1–19.

Arner, D. W., Barberis, J., & Buckley, R. P. (2016). *The Finsia Journal of Applied Finance*, *3*(3), 22–29.

Barroso, M., & Laborda, J. (2022). Digital transformation and the emergence of the Fintech sector: Systematic literature review. *Digital Business*, 2(2), Article 100028. https://doi.org/10.1016/j.digbus.2022.100028

Beinke, J. H., Nguyen, D., & Teuteberg, F. (2018). Towards a business model taxonomy of startups in the finance sector using blockchain. In: Proceedings of the 39th International Conference on Information Systems (ICIS), San Francisco, CA, USA.

Benyon, D. (2014). Designing interactive systems: A comprehensive guide to HCI, UX and interaction design. Pearson, Harlow, England.

Benyon, D. (2019). Designing user experience: A guide to HCI, UX and interaction design. Pearson, Harlow, England.

Bican, P. M., & Brem, A. (2020). Digital business model, digital transformation, digital entrepreneurship: Is there a sustainable "digital"? *Sustainability*, *12*(13), 5239.

Birks, D. F., Fernandez, W., Levina, N., & Nasirin, S. (2013). Grounded theory method in information systems research: Its nature, diversity and opportunities. *European Journal of Information Systems*, *22*(1), 1–8.

Boot, A., Hoffmann, P., Laeven, L., & Ratnovski, L. (2021). Fintech: What's old, what's new? *Journal of Financial Stability*, *53*, Article 100836. https://doi.org/10.1016/j.jfs.2020.100836

Breidbach, C. F., Keating, B. W., & Lim, C. (2020). Fintech: Research directions to explore the digital transformation of financial service systems. *Journal of Service Theory and Practice*, *30*(1), 79–102.

Buck, C., & Eder D. (2018). The impact of digitization on business models – A systematic literature review. In: *Proceedings of the 24th Americas Conference on Information Systems (AMCIS)*, New Orleans, LA, USA.

Bureshaid, N., Lu, K., & Sarea, A. (2021). Adoption of Fintech services in the banking industry. In *Applications of Artificial Intelligence in Business, Education and Healthcare*. Springer, Cham. 125–138.

Caldarini, G., Jaf, S., & McGarry, K. (2022). A literature survey of recent advances in Chatbots. *Information*, *13*(1), Article 41. https:// doi.org/10.3390/info13010041

Carranza, R., Díaz, E., Sánchez-Camacho, C., & Martín-Consuegra, D. (2021). E-Banking adoption: An opportunity for customer value co-creation. *Frontiers in Psychology*, *11*, Article 621248. https://doi.org/10.3389/fpsyg.2020.621248

Chang, S. J., Van Witteloostuijn, A. & Eden L. (2010). From the editors: Common method variance in international business research. *Journal of International Business Studies*, *41*(2), 178–184.

Chen, M. A., Wu, Q., & Yang, B. (2019). How valuable is FinTech innovation? *The Review of Financial Studies*, *32*(5), 2062–2106.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, New Jersey: Lawrence Erlbaum Associates, Publishers.

Cohen, J., Cohen, P., West, S.G., & Aiken, L.S. (2003). *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences* (3rd ed.). Mahwah, New Jersey: Lawrence Erlbaum Associates, Publishers.

Cramér, H. (1999). *Mathematical Methods of Statistics*. Princeton University Press, Princeton.

Cruchbase. (2023). Crunchbase database. Retrieved June 10, 2023, from https://www.crunchbase.com/hub/fintech-companies-late-stage-venture-funding

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319–339.

De Vries, H., Tummers, L., & Bekkers, V. (2018). The diffusion and adoption of public sector innovations: A meta-synthesis of the literature. *Perspectives on Public Management and Governance*, *1*(3), 159–176.

Depietro, R., Wiarda, E., & Fleischer, M. (1990). The context for change: organization, technology and environment. In: *Tornatzky, L. G., & Fleischer, M*. (Eds.): The Processes of Technological Innovation, Lexington, 151–175.

Diederich, S., Brendel, A. B., Morana, S., & Kolbe, L. (2022). On the design of and interaction with conversational agents: An organizing and assessing review of human-computer interaction research. *Journal of the Association for Information Systems*, *23*(1), 96–138.

Diener, F., & Špaček, M. (2021). Digital transformation in banking: A managerial perspective on barriers to change. *Sustainability*, *13*(4), 2032.

Dinev, T., Xu, H., Smith, J. H., and Hart, P. (2013). Information privacy and correlates: An empirical attempt to bridge and distinguish privacy-related concepts. *European Journal of Information Systems*, *22*(3), 295–316.

Dorfleitner, G., Hornuf, L., Schmitt, M., & Weber, M. (2017). The FinTech market in Germany. In *FinTech in Germany*. Springer, Cham, 13–46.

Drechsler, K., Gregory, R., Wagner, H. T., & Tumbas, S. (2020). At the crossroads between digital innovation and digital transformation. *Communications of the Association for Information Systems*, *47*(1), 521–538

Eden, T., Werth, O., Rodríguez Cardona, D., Schwarzbach, C., Breitner, M. H., & Graf von der Schulenburg, J.-M. (2022). Influences of digital innovations on advisory work in the financial services sector. *Die Unternehmung: Swiss Journal of Business Research and Practice*, *76*(1), 6–27.

Eickhoff, M., Muntermann, J., & Weinrich, T. (2017). What do Fintechs actually do? A taxonomy of FinTech business models. In: *Proceedings of the 38th International Conference on Information Systems (ICIS)*, Seoul, South Korea.

Elia, G., Stefanelli, V., & Ferilli, G.B. (2022). Investigating the role of Fintech in the banking industry: What do we know? *European Journal of Innovation Management*. Advance online publication. https://doi.org/10.1108/EJIM-12-2021-0608

Ellström, D., Holtström, J., Berg, E., & Josefsson, C. (2022). Dynamic capabilities for digital transformation. *Journal of Strategy and Management*, *15*(2), 272–286.

Elshan, E., Zierau, N., Engel, C., Janson, A., & Leimeister, J. M. (2022). Understanding the design elements affecting user acceptance of intelligent agents: Past, present and future. *Information Systems Frontiers*, *24*, 699–730.

Featherman, M. S., Miyazaki, A. D., & Sprott, D. E. (2010). Reducing online privacy risk to facilitate e-service adoption: The influence of perceived ease of use and corporate credibility. Journal of Services Marketing, 24(3), 219–229.

Fishbein, M., & Ajzen, I. (1975). Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research. Addison-Wesley Pub. Co.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, *18*(1), 39–50.

Fuchs, C., & Hess, T. (2018). Becoming agile in the digital transformation: The process of a large-scale agile transformation. In: *Proceedings of the 39th International Conference on Information Systems (ICIS)*, San Francisco, CA, USA.

Gerster, D., Dremel, C., & Kelker, P. (2018). “Agile meets non-agile”: Implications of adopting agile practices at enterprises. In: *Proceedings of the 24th Americas Conference on Information Systems (AMCIS)*, New Orleans, LA, USA.

Gimpel, H., Rau, D., & Röglinger, M. (2018). Understanding FinTech start-ups–A taxonomy of consumer-oriented service offerings. *Electronic Markets*, *28*(3), 245–264.

Glaser, B. G. (1978). *Theoretical sensitivity: Advances in the methodology of grounded theory*. Mill Valley, CA: The Sociology Press.

Glaser, B. G. & Strauss, A. L. (1967). *Discovery of grounded theory: Strategies for qualitative research*. Mill Valley, CA: The Sociology Press.

Gomber, P., Koch, J. A., & Siering, M. (2017). Digital finance and FinTech: Current research and future research directions. *Journal of Business Economics*, *87*(5), 537–580.

Gong, C., & Ribiere, V. (2021). Developing a unified definition of digital transformation. *Technovation*, *102*, Article 102217. https://doi.org/10.1016/j.technovation.2020.102217

Gozman, D., Liebenau, J., & Mangan, J. (2018). The innovation mechanisms of FinTech start-ups: Insights from SWIFT’s innotribe competition. *Journal of Management Information Systems*, *35*(1), 145–179.

Greineder, M., Riasanow, T., Böhm, M., & Krcmar, H., (2020). The generic Insurtech ecosystem and its strategic implications for the digital transformation of the insurance industry. In: Mayr, H. C., Rinderle-Ma, S. & Strecker, S. (Eds.), 40 Years EMISA 2019. Bonn: Gesellschaft für Informatik e.V., 119–132.

Gupta, A. (2013). Environmental and PEST analysis: An approach to external business environment. *International Journal of Modern Social Science, 2*, 34–43.

Gupta, S., Ghardallou, W., Pandey, D. K., & Sahu, G. P. (2022). Artificial intelligence adoption in the insurance industry: Evidence using the technology–organization–environment framework. *Research in International Business and Finance*, *63*, Article 101757.https://doi.org/10.1016/j.ribaf.2022.101757

Hair., J. F., Hult, G. T. M., Ringle, C. and Sarstedt, M. (2016). A primer on partial least squares structural equation modeling (PLS-SEM), Sage publications.

Hameed, M. A., Counsell, S., & Swift, S. (2012). A meta-analysis of relationships between organizational characteristics and IT innovation adoption in organizations. *Information & Management, 49*(5), 218–232.

Hanelt, A., Bohnsack, R., Marz, D., & Antunes Marante, C. (2021). A systematic review of the literature on digital transformation: Insights and implications for strategy and organizational change. *Journal of Management Studies*, *58*(5), 1159–1197.

Hekkala, R., Stein, M.-K., Rossi, M., and Smolander, K. (2017). Challenges in transitioning to an agile way of working. In: *Proceedings of the 50th Hawaii International Conference on System Sciences (HICSS), Waikoloa, HI, USA.*

Henseler, J., Ringle, C. M., & Sarstedt M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, *43*(1), 115–135.

Holmström, J. (2022). From AI to digital transformation: The AI readiness framework. *Business Horizons*, *65*(3), 329–339.

Hwang, D., Thorogood, A., & Van Toorn, C. (2022). The FinTech perspective on banks: collaboration, challenges and recommendations. *In: Proceedings of the 26th Pacific Asia Conference on Information Systems (PACIS), Taipei, Sydney.*

Iman, N. (2020). The rise and rise of financial technology: The good, the bad, and the verdict. *Cogent Business & Managemen*t, *7*(1), Article 1725309. https://doi.org/10.1080/23311975.2020.1725309

Imerman, M. B., & Fabozzi, F. J. (2020). Cashing in on innovation: A taxonomy of FinTech. *Journal of Asset Management*, *21*, 167–177.

Janssen, A., Passlick, J., Rodríguez Cardona, D., & Breitner, M. H. (2020). Virtual assistance in any context: A taxonomy of design elements for domain-specific Chatbots. *Business & Information Systems Engineering*, *62*(3), 211–225.

Janssen, A., Rodríguez Cardona, D., & Breitner, M.H. (2021) More than FAQ! Chatbot taxonomy for business-to-business customer services. In: Følstad A. et al. (Eds.) Chatbot Research and Design. CONVERSATIONS 2020. Lecture Notes in Computer Science (LNCS), 12604. Springer, Cham.

Janssen, A., Rodríguez Cardona, D., Passlick, J., & Breitner, M. H. (2022). How to make Chatbots productive – A user-oriented implementation framework. *International Journal of Human-Computer Studies*, *168*, Article 102921. https://doi.org/10.1016/j.ijhcs.2022.102921

Karnowski, V., & Kümpel A. S. (2016). Diffusion of innovations. In: Schlüsselwerke der Medienwirkungsforschung (pp. 97–107). Wiesbaden: Springer Fachmedien Wiesbaden.

Khan, C. B. A. (2018). Estimating diffusion of technology using user perceptual values: A conceptual model. In *5th International Conference on Industrial Engineering and Applications (ICIEA)*, 401–405, Singapore. https://doi.org/10.1109/IEA.2018.8387133

Kitsios, F., Giatsidis, I., & Kamariotou, M. (2021). Digital transformation and strategy in the banking sector: Evaluating the acceptance rate of e-services. *Journal of Open Innovation: Technology, Market, and Complexity*, *7*(3), Article 204. https://doi.org/10.3390/joitmc7030204

Klein, H.K., & Myers, M.D. (1999). A set of principles for conducting and evaluating interpretive field studies in information systems. *MIS Quarterly*, *23*(1), 67–93.

Krasonikolakis, I., Tsarbopoulos, M., & Eng, T. Y. (2020). Are incumbent banks bygones in the face of digital transformation? *Journal of General Managemen*t, *46*(1), 60–69.

Kraus, S., Durst, S., Ferreira, J. J., Veiga, P., Kailer, N., & Weinmann, A. (2022). Digital transformation in business and management research: An overview of the current status quo. *International Journal of Information Management*, *63*, Article 102466. https://doi.org/10.1016/j.ijinfomgt.2021.102466

Kundisch, D., Muntermann, J., Oberländer, A. M., Rau, D., Röglinger, M., Schoormann, T., & Szopinski, D. (2021). An update for taxonomy designers. *Business & Information Systems Engineering*, *64*, 421–439.

Kutzner, K., Schoormann, T., & Knackstedt, R. (2018). Digital transformation in information systems research: A taxonomy-based approach to structure the field. In: *Proceedings of the 26th European Conference on Information Systems (ECIS)*, Portsmouth, UK.

Lankton, N. K., McKnight, D. H., & Tripp, J. (2015). Technology, humanness, and trust: Rethinking trust in technology. *Journal of the Association for Information Systems*, *16*(10), 880–918.

Liere-Netheler, K., Vogelsang, K., Packmohr, S., & Hoppe, U. (2018). Towards a framework for digital transformation success in manufacturing. In: *Proceedings of the 26th European Conference on Information Systems (ECIS)*, Portsmouth, UK.

Locatelli, R., Schena, C., & Tanda, A. (2021). A historical perspective on disruptive technologies. In: King, T., Stentella Lopes, F.S., Srivastav, A., Williams, J. (Eds.) Disruptive

Technology in Banking and Finance. Palgrave Studies in Financial Services Technology. Palgrave Macmillan, Cham.

Luo, B., Lau, R. Y., Li, C., & Si, Y. W. (2022). A critical review of state-of-the-art chatbot designs and applications. *Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery*, *12*(1), Article e1434. https://doi.org/10.1002/widm.1434

Markus, M. L., & Rowe, F. (2021). Theories of digital transformation: A progress report [Guest Editorial]. *Journal of the Association for Information Systems*, *22*(2), 273–280.

Mcknight, D. H., Carter, M., Thatcher, J. B., & Clay, P. F. (2011). Trust in a specific technology: An investigation of its components and measures. *Transactions on Management Information Systems*, *2*(2), 1–13.

Mettler, T., & Ballester, O. (2021). Maturity models in information systems: A review and extension of existing guidelines. In: Proceedings of the 42nd International Conference on Information Systems (ICIS), Austin, TX, USA.

Murinde, V., Rizopoulos, E., & Zachariadis, M. (2022). The impact of the FinTech revolution on the future of banking: Opportunities and risks. *International Review of Financial Analysis*, *81*, Article 102103. https://doi.org/10.1016/j.irfa.2022.102103

Muthukannan, P., & Gozman, D. (2019). Meeting the challenge of FinTech startups: the development of dynamic capabilities at incumbent banks. In: *Proceedings of the 40th International Conference on Information Systems (ICIS)*, Munich, Germany.

Myers, M. D. (2020). Qualitative research in Business & Management (3rd Ed). London: Sage Publications.

Nadkarni, S., & Prügl, R. (2021). Digital transformation: A review, synthesis and opportunities for future research. *Management Review Quarterly*, *71*(2), 233–341.

Naimi-Sadigh, A., Asgari, T., & Rabiei, M. (2022). Digital transformation in the value chain disruption of banking services. *Journal of the Knowledge Economy*, *13*(2), 1212–1242.

Neale, F. R., Drake, P. P., & Konstantopoulos, T. (2020). Insurtech and the disruption of the insurance industry. *Journal of Insurance Issues*, *43*(2), 64–96.

Ng, E., Tan, B., Sun, Y., & Meng, T. (2023). The strategic options of Fintech platforms: An overview and research agenda. *Information Systems Journal*, *33*(2), 1–40. https://doi.org/10.1111/isj.12388

Nickerson, R. C., Varshney, U., & Muntermann, J. (2013). A method for taxonomy development and its application in information systems. *European Journal of Information Systems*, *22*(3), 336–359.

Niemand, T., Rigtering, J. C., Kallmünzer, A., Kraus, S., & Maalaoui, A. (2021). Digitalization in the financial industry: A contingency approach of entrepreneurial orientation and strategic vision on digitalization. *European Management Journal*, *39*(3), 317–326.

Nißen, M.K., Selimi, D., Janssen, A., Rodríguez Cardona, D., Breitner, M.H., Kowatsch, T., & von Wangenheim, F. (2022). See you soon again, chatbot? A design taxonomy to characterize user-chatbot relationships with different time horizons. *Computers in Human Behavior*, *127*, Article 107043. https://doi.org/10.1016/j.chb.2021.107043

Pöppelbuß, J., Niehaves, B., Simons, A., & Becker, J. (2011). Maturity models in information systems research: Literature search and analysis. *Communications of the Association for Information Systems*, *29*(1), Article 27, 505–3532.

Porter, M.E. (1980). Competitive strategy: techniques for analyzing industries and competitors. Simon and Schuster, New York.

Przegalinska, A., Ciechanowski, L., Stroz, A., Gloor, P., & Mazurek, G. (2019). In bot we trust: A new methodology of chatbot performance measures. B*usiness Horizons*, *62*(6), 785–797.

Purewal, K., & Haini, H. (2022). Re-examining the effect of financial markets and institutions on economic growth: evidence from the OECD countries. *Economic Change and Restructuring*, *55*(1), 311–333.

Puschmann, T. (2017). Fintech. *Business & Information Systems Engineering*, *59*(1), 69–76.

Reis, J., Amorim, M., Melão, N., & Matos, P. (2018). Digital transformation: A literature review and guidelines for future research. In: Rocha, Á., Adeli, H., Reis, L.P., Costanzo, S. (Eds.), *Advances in Intelligent Systems and Computing: Vol. 745. Trends and Advances in Information Systems and Technologies. WorldCIST'18 2018.* (pp. 411–421). Springer, Cham. https://doi.org/10.1007/978-3-319-77703-0_41

Rha, J. S., & Lee, H. H. (2022). Research trends in digital transformation in the service sector: A review based on network text analysis. *Service Business*, *16*, 77–98.

Riasanow, T., Burckhardt, F., Soto Setzke, D., Böhm, M., & Krcmar, H. (2018). The generic blockchain ecosystem and its strategic implications. In: *Proceedings of the 24th Americas Conference of Information Systems*, New Orleans, LA, United States.

Rodríguez Cardona, D., Janssen, A., & Breitner, M. H. (2021). The role of user involvement: Relationship between participatory design and design science research. In: *IWI Discussion Paper Series (#97)*. ISSN: 1612-3646.

Rodríguez Cardona, D., Janssen, A., & Breitner, M. H. (2021). The role of user involvement: relationship between participatory design and design science research. In: *IWI Discussion Paper Series (#97)*. ISSN: 1612–3646.

Rodríguez Cardona, D., Janssen, A., Guhr, N., Breitner, M. H., & Milde, J. (2021a). A matter of trust? Examination of chatbot usage in insurance business. In: *Proceedings of the 54th Hawaii International Conference on System Sciences (HICSS)*, Kauai, USA (Virtual).

Rodríguez Cardona, D., Janssen, A., Uphaus, J., Fischer, J., & Breitner, M. H. (2020). Nutzerakzeptanz von Robo-Advisor Systemen für das digitale Investitionsmanagement in Deutschland. In: *IWI Discussion Paper Series (#96)*. ISSN: 1612–3646.

Rodríguez Cardona, D., Werth, O., Schönborn, S., & Breitner, M.H. (2019). A mixed methods analysis of the adoption and diffusion of chatbot technology in the German insurance sector. In: *Proceedings of the 25th Americas Conference on Information Systems (AMCIS)*, Cancun, Mexico.

Roeder, J., Rodríguez Cardona, D., Palmer, M., Werth, O., Muntermann, J., & Breitner, M. H. (2018). Make or break: Business model determinants of FinTech venture success. In: *Proceedings of the Multikonferenz Wirtschaftsinformatik (MKWI 2018)*, Lüneburg, Germany.

Rogers, E. M. (2010). *Diffusion of innovations*. New York: The Free Press. 4th Edition.

Ross, J. W., Sebastian, I. M., Beath, C., Mocker, M., Moloney, K., & Fonstad, N. (2016). Designing and executing digital strategies. In: *Proceedings of the 14th International Conference on Information Systems (ICIS)*. Dublin, Ireland.

Ryu, H. S., & Ko, K. S. (2020). Sustainable development of Fintech: Focused on uncertainty and perceived quality issues. *Sustainability*, *12*(18), Article 7669. https://doi.org/10.3390/su12187669

Sakib, N.H. (2020). Institutional isomorphism. In: Farazmand, A. (Eds.) Global Encyclopedia of Public Administration, Public Policy, and Governance. Springer, Cham. https://doi.org/10.1007/978-3-319-31816-5_3932-1

Salmela, H., Baiyere, A., Tapanainen, T., & Galliers, R. D. (2022). Digital agility: Conceptualizing agility for the digital era. *Journal of the Association for Information Systems*, *23*(5), 1080–1101.

Schmidt, C. (2018). *Insurance in the digital age: A view on key implications for the economy and society*. The Geneva Association—International Association for the Study of Insurance Economics, Zurich. Retrieved 12 January 2023 from https://www.genevaassociation.org/sites/default/files/research-topics-document-type/pdf_public/insurance_in_the_digital_age_01.pdf

Schuelke-Leech, B. A. (2018). A model for understanding the orders of magnitude of disruptive technologies. *Technological Forecasting and Social Change*, *129*, 261–274.

Sebastian, I., Ross, J., Beath, C., Mocker, M., Moloney, K., & Fonstad, N. (2017). How big old companies navigate digital transformation. *MIS Quarterly Executive*, *16*(3), 197–213.

Siek, M., & Sutanto, A. (2019). Impact analysis of FinTech on banking industry. In: *Proceedings of 2019 International Conference on Information Management and Technology (ICIMTech)*, Jakarta, Indonesia.

Skog, D. A., Wimelius, H., & Sandberg, J. (2018). Digital disruption. *Business & Information Systems Engineering*, *60*(5), 431–437.

Soto Setzke, D., Riasanow, T., Böhm, M., & Krcmar, H. (2021). Pathways to digital service innovation: The role of digital transformation strategies in established organizations. *Information Systems Frontiers*. https://doi.org/10.1007/s10796-021-10112-0

Stoeckli, E., Dremel, C., & Uebernickel, F. (2018). Exploring characteristics and transformational capabilities of Insurtech innovations to understand insurance value creation in a digital world. *Electronic markets*, *28*(3), 287–305.

Strauss, A. L. (1987). *Qualitative analysis for social scientists*. Cambridge university press.

Sun, Y., Li, S., & Wang, R. (2022). Fintech: From budding to explosion- An overview of the current state of research. *Review of Managerial Science*, 1–41. Advance online publication. https://doi.org/10.1007/s11846-021-00513-5

Teichert, R. (2019). Digital transformation maturity: A systematic review of literature. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, *67*(6), 1673–1687.

Teo, T. (2011). Technology Acceptance Research in Education. In: Teo, T. (eds) Technology Acceptance in Education. Sense Publishers. https://doi.org/10.1007/978-94-6091-487-4_1

Thakor, A. V. (2020). Fintech and banking: What do we know? J*ournal of Financial Intermediation*, *41*, Article 100833. https://doi.org/10.1016/j.jfi.2019.100833

Tight, M. (2022). Designing case studies, In: Flick, U. (Ed) *The sage handbook of qualitative research design*. Vol. 2. (pp. 399–413). London: Sage.

Trischler, M. F. G., & Li-Ying, J. (2022). Digital business model innovation: Toward construct clarity and future research directions. *Review of Managerial Science*, 1–30.

Ukobitz, D. V., & Faullant, R. (2022). The relative impact of isomorphic pressures on the adoption of radical technology: Evidence from 3D printing. *Technovation*, *113*, Article 102418. https://doi.org/10.1016/j.technovation.2021.102418

Urbinati, A., Manelli, L., Frattini, F., & Bogers, M. L. (2022). The digital transformation of the innovation process: Orchestration mechanisms and future research directions. *Innovation*, *24*(1), 65–85.

Usman, M., Britto, R., Börstler, J., & Mendes, E. (2017) Taxonomies in software engineering: A systematic mapping study and a revised taxonomy development method. *Information and Software Technology*, *85*, 43–59.

Vaishnavi, V. K., & Kuechler, W. (2015). *Design science research methods and patterns: innovating information and communication technology*. Boca Raton: Crc Press.

van Offenbeek, M., Boonstra, A., & Seo, D. (2013). Towards integrating acceptance and resistance research: Evidence from a telecare case study. *European Journal of Information Systems*, *22*(4), 434–454.

Van Veldhoven, Z., & Vanthienen, J. (2022). Digital transformation as an interaction-driven perspective between business, society, and technology. *Electronic Markets*, *32*(2), 629–644.

Venkatesh, V., & Bala, H. (2008). Technology acceptance model 3 and a research agenda on interventions. *Decision Sciences, 39*(2), 273–315.

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: four longitudinal field studies. *Management Science*, *46*(2), 186–204.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User Acceptance of information technology: toward a unified view. *MIS Quarterly*, *27*(3), 425–478.

Verhoef, P. C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Dong, J. Q., Fabian, N., & Haenlein, M. (2021). Digital transformation: A multidisciplinary reflection and research agenda. *Journal of Business Research*, *122*, 889–901.

Vial, G. (2019). Understanding digital transformation: A review and a research agenda. *Journal of Strategic Information Systems*, *28*, 118–44.

Wade, M., & Shan, J. (2020). Covid-19 has accelerated digital transformation, but may have made it harder not easier. *MIS Quarterly Executive*, *19*(3), 213–220.

Ward J.H. (1963) Hierarchical grouping to optimize an objective function. Journal of the American Statistical Association, *58*(301), 236–244.

Warner, K. S., & Wäger, M. (2019). Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal. *Long Range Planning*, *52*(3), 326–349.

Webster, J., & Watson, R. T. (2002). Analyzing the past to prepare for the future: Writing a review. *MIS Quarterly*, *26*(2), 13–23.

Weking, J., Hein, A., Böhm, M., & Krcmar, H. (2020). A hierarchical taxonomy of business model patterns. *Electronic Markets*, *30*(3), 447–468.

Werth, O., Rodríguez Cardona, D., Nowatschin, J., Werner, M., Guhr, N., & Breitner, M. H. (2019). Challenges of the financial industry - An analysis of critical success factors for FinTechs. In: *Proceedings of the 25th Americas Conference on Information Systems (AMCIS)*, Cancun, Mexico.

Werth, O., Rodríguez Cardona, D., Torno, A., Breitner, M. H., & Muntermann, J. (2023). What determines FinTech success? —A taxonomy-based analysis of FinTech success factors. *Electronic Markets*, *33*, Article 21. https://doi.org/10.1007/s12525-023-00626-7

Werth, O., Schwarzbach, C., Rodríguez Cardona, D., Breitner, M. H., & Graf von der Schulenburg, J.-M. (2020). Influencing factors for the digital transformation in the financial services sector. *Zeitschrift für die gesamte Versicherungswissenschaft*, *109*, 155–179.

Wiesche, M., Jurisch, M. C., Yetton, P., & Krcmar, H. (2017). Grounded theory methodology in information systems research. *MIS Quarterly*, *41*(3), 685–701.

Yin, R.K. (2018). Case study research and applications: Design and methods (6th ed.). London: Sage.

Appendices

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A - Business Model Determinants of FinTech Venture Success

Appendix A

Make or Break: Business Model Determinants of FinTech Venture Success

Jan Roeder, Davinia Rodríguez Cardona, Matthias Palmer, Oliver Werth, Jan Muntermann, and Michael H. Breitner

Citation:

Roeder, J., Rodríguez Cardona, D., Palmer, M., Werth, O., Muntermann, J., and Breitner, M. H. (2018). Make or Break: Business Model Determinants of FinTech Venture Success. In *Proceedings of Multikonferenz Wirtschaftsinformatik (MKWI) 2018*, Lüneburg, Germany, pp. 1221-1232.

Repository Uniform Resource Locator (URL):

http://mkwi2018.leuphana.de/wp-content/uploads/MKWI2018_Band3.pdf

Abstract:

In recent years, the phenomenon of rapidly proliferating FinTech companies along diverse segments of the financial services value chain has attracted considerable interest in academic research and practice. So far, various factors of FinTech venture success have been explored, but there is little empirical insight through the lens of business model theory. To close this gap, we build on a FinTech business model taxonomy and examine 221 FinTech companies in order to statistically infer crucial business model determinants responsible for FinTech venture success. Our findings show that the business model component “Product/Service Offering” is the most important determinant for the success of a FinTech venture.

Keywords:

FinTech, Business Model, Venture Success, Taxonomy

B - Chatbot Technology in the German Insurance Sector

Appendix B

A Mixed Methods Analysis of the Adoption and Diffusion of Chatbot Technology in the German Insurance Sector

Davinia Rodríguez Cardona, Oliver Werth, Svenja Schönborn, and Michael H. Breitner

Citation:

Rodríguez Cardona, D., Werth, O., Schönborn, S., Breitner, M.H. (2019). A Mixed Methods Analysis of the Adoption and Diffusion of Chatbot Technology in the German Insurance Sector. In 25th Proceedings of the Americas Conference on Information Systems (AMCIS), Cancun, Mexico.

Repository URL:

https://aisel.aisnet.org/amcis2019/adoption_diffusion_IT/adoption_diffusion_IT/18

Abstract:

In recent years, gradual improvements in information, computing, communication and connectivity technologies have enabled new technical possibilities for the adoption of Chatbots across diverse sectors. In the case of the insurance sector, the implementation of service innovations based on Chatbot technology can contribute, among other benefits, to improve the efficiency across the insurance value chain, reduce costs and generate customer loyalty and trust (Barrett et al., 2015; Ross et al., 2016). However, despite the advantages, the adoption success of Chatbot Technology depends on the understanding of the ambivalent perceptions, attitudes, and beliefs of the main social actors (i.e. practitioners and potential users) towards the customer interface. Using a mixed methods design based on an interpretive paradigm and within the frameworks of acceptance and diffusion research, we identified the “relative advantages” and “IS infrastructure” as the most critical ambivalent socio-technical factors for the adoption and diffusion of Chatbot technology in Germany.

Keywords:

Acceptance and Diffusion Research, Ambivalent IT, Technology, Organization, Environment (TOE) Model

C - Critical Success Factors for FinTechs

Appendix C

Challenges of the Financial Industry –

An Analysis of Critical Success Factors for FinTechs

Oliver Werth, Davinia Rodríguez Cardona, Jan Nowatschin, Matthias Werner, Nadine Guhr, and Michael H. Breitner

Citation:

Werth, O., Rodríguez Cardona, D., Nowatschin, J., Werner, M., Guhr, N., & Breitner, M. H. (2019). Challenges of the Financial Industry-An Analysis of Critical Success Factors for FinTechs. In 25th Proceedings of the Americas Conference on Information Systems (AMCIS), Cancun, Mexico.

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https://aisel.aisnet.org/amcis2019/ebusiness/ebusiness/4

Abstract:

FinTechs are attracting ongoing interest in both academia and practice. With the use of techniques borrowed from grounded theory, we analyze material from 10 interviews with managers and Chief Executive Officers at FinTechs and 8 interviews with venture capitalists (VCs). We examined 15 critical success factors (CSFs) for FinTech ventures. These are divided into 9 factors that generally apply to general ventures: (1) team, (2) entrepreneur, (3) capital, (4) product/market fit, (5) idea and execution, (6) pivoting and continuous learning, (7) customer acquisition, (8) internationalization, and (9) networking. In addition, we examine 6 factors that have specific relevance to FinTech venture success, namely, (10) technological advantage, (11) regulatory knowledge, (12) B2B focus, (13) incumbent partnerships, (14) growth potential, and (15) exit options for VCs. Our study expands the literature on CSFs for FinTechs and provides recommendations for entrepreneurs to be more successful.

Keywords:

FinTechs, Critical Success Factors, Grounded Theory, Venture Capital Success

D - Taxonomy of Design Elements for Domain-Specific Chatbots

Appendix D

Virtual Assistance in any Context:

A Taxonomy of Design Elements for Domain-Specific Chatbots

Antje Janssen, Jens Passlick, Davinia Rodríguez Cardona, and Michael H. Breitner

Citation:

Janssen, A., Passlick, J., Rodríguez Cardona, D., & Breitner, M. H. (2020). Virtual Assistance in any Context: A Taxonomy of Design Elements for Domain-Specific Chatbots. Business & Information Systems Engineering, 62(3), pp. 211-225.

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https://doi.org/10.1007/s12599-020-00644-1

Abstract:

Several domain-specific assistants in the form of Chatbots have conquered many commercial and private areas. However, there is still a limited level of systematic knowledge of the distinctive characteristics of design elements for Chatbots to facilitate development, adoption, implementation, and further research. To close this gap, the paper outlines a taxonomy of design elements for Chatbots with 17 dimensions organized into the perspectives intelligence, interaction and context. The conceptually grounded design elements of the taxonomy are used to analyze 103 Chatbots from 23 different application domains. Through a clustering-based approach, five chatbot archetypes that currently exist for domain-specific Chatbots are identified. The developed taxonomy provides a structure to differentiate and categorize domain-specific Chatbots according to archetypal qualities that guide practitioners when taking design decisions. Moreover, the taxonomy serves academics as a foundation for conducting further research on chatbot design while integrating scientific and practical knowledge.

Keywords:

Chatbot Taxonomy, Design Elements, Domain-specific Chatbots, Human Computer Interaction

E - Digital Transformation in the Financial Services Sector

Appendix E

Influencing Factors for the Digital Transformation in the Financial Services Sector

Oliver Werth, Christoph Schwarzbach, Davinia Rodríguez Cardona, Michael H. Breitner, and Johann-Matthias Graf von der Schulenburg

Citation:

Werth, O., Schwarzbach, C., Rodríguez Cardona, D., Breitner, M. H., & Graf von der Schulenburg, J.-M. (2020). Influencing Factors for the Digital Transformation in the Financial Services Sector. Zeitschrift für die gesamte Versicherungswissenschaft, 109, 155–179.

Repository URL:

https://doi.org/10.1007/s12297-020-00486-6

Abstract:

Digital transformation affects almost every area in societies and has consequences for incumbent companies. With qualitative research, we explore the influencing factors for digital transformation in the financial services sector. We use a PEST-model and Porter's Five Forces as the underlying structure for our analysis. Our interviews and findings show that the financial services sector face the same current challenges, but their impact is perceived higher in the banking than in the insurance sector concerning social factors and bargaining power of buyers. The character of the current development is evolutionary rather than disruptive. Almost all incumbents currently focus on modernizing and consolidating their backend- systems. The aim is to enable them for new customer-oriented services. A primary driver for the digital transformation is the threat of a broader market entry by BigTechs. Our research provides a comprehensive overlook about the influencing factors of digital transformation using statements from experts in the field.

Keywords:

Influencing Factors, Digital Transformation, Financial Services Sector, Banks and Insurances, Qualitative Research

F - Digital Investment Management in Germany

Appendix F

Nutzerakzeptanz von Robo-Advisor Systemen für das digitale Investitionsmanagement in Deutschland

Davinia Rodríguez Cardona, Antje Janssen, Julian Uphaus, Julian Fischer, and Michael H. Breitner

Citation:

Rodríguez Cardona, D., Janssen, A., Uphaus, J., Fischer, J., & Breitner, M. H. (2020). “Nutzerakzeptanz von Robo-Advisor Systemen für das digitale Investitionsmanagement in Deutschland.” In: IWI Discussion Paper Series (#96). ISSN: 1612-3646.

Repository URL:

https://www.iwi.uni-hannover.de/fileadmin/iwi/Publikationen/DP/K_96_IWI_DP.pdf

Abstract (English version):

The main purpose of this discussion paper is to gain insights into the factors that determine the acceptance of robo-advisor systems in Germany. To this end, we extended the unified theory of acceptance and use of technology 2 (UTAUT2) model to explore the influence of three additional constructs of degree of automation, cost structure and risk perception on the users' behavioral intention towards robo-advisor systems. The primary was data collected through a questionnaire survey with 250 respondents and analyzed using structural equation modeling (SEM) with a partial least squares (PLS) approach. The results of the analysis indicate that the performance expectancy and the degree of automation are the key factors influencing acceptance of robo-advisor systems in Germany. Moreover, different socio-economic moderators, such as age, education or income, also showed a significant influence on robo-advisor systems use. The empirical outcomes also revealed a low level of awareness regarding robo-advisor systems, therefore diverse measures such as increasing advertising attempts and trial accounts could contribute to push the adoption of the robo-advisor systems in Germany.

Keywords:

Robo-Advisor System, User Acceptance, Digital Investment Management, UTAUT2

G - Chatbot Usage in Insurance Business

Appendix G

A Matter of Trust? Examination of Chatbot Usage in Insurance Business

Davinia Rodríguez Cardona, Antje Janssen, Nadine Guhr, Michael H. Breitner, and Julian Milde

Citation:

Rodríguez Cardona, D., Janssen, A., Guhr, N., Breitner, M. H., & Milde, J. (2021). A Matter of Trust? Examination of Chatbot Usage in Insurance Business. In Proceedings of the 54th Hawaii International Conference on System Sciences (HICSS), Kauai, USA (Virtual).

Repository URL:

https://doi.org/10.24251/HICSS.2021.068

Abstract:

Critical success factors such as trust and privacy concerns have been recognized as grand challenges for research of intelligent interactive technologies. Not only their ethical, legal, and social implications, but also their role in the intention to use these technologies within high risk and uncertainty contexts must be investigated. Nonetheless, there is a lack of empirical evidence about the factors influencing user's intention to use insurance Chatbots (ICB). To close this gap, we analyze (i) the effect of trust and privacy concerns on the intention to use ICB and (ii) the importance of these factors in comparison with the widely studied technology acceptance variables of perceived usefulness and perceived ease of use. Based on the results of our online survey with 215 respondents and partial least squares structural equation modelling (PLS-SEM), our findings indicate that although trust is important, other factors, such as the perceived usefulness, are most critical for ICB usage.

Keywords:

Human–Robot Interactions, Chatbot Usage, Insurance, Privacy Concerns, Structural Equation Modelling, Trust

H - Chatbot Taxonomy for Business-to-Business Customer Services

Appendix H

More than FAQ!

Chatbot Taxonomy for Business-to-Business Customer Services

Antje Janssen, Davinia Rodríguez Cardona, and Michael H. Breitner

Citation:

Janssen, A., Rodríguez Cardona, D., & Breitner, M.H. (2021) More than FAQ! Chatbot Taxonomy for Business-to-Business Customer Services. In: Følstad A. et al. (Eds) Chatbot Research and Design. CONVERSATIONS 2020. Lecture Notes in Computer Science (LNCS), 12604. Springer, Cham.

Repository URL:

https://doi.org/10.1007/978-3-030-68288-0_12

Abstract:

Chatbots are becoming increasingly important in the customer service sector due to their service automation, cost saving opportunities and broad customer satisfaction. Similarly, in the business-to-business (B2B) sector, more and more companies use Chatbots on their websites and social media channels, to establish sales team contact, to provide information about their products and services or to help customers with their requests and claims. Customer relations in the B2B environment are especially characterized by a high level of personal contact service and support through expert explanations due to the complexity of the products and service offerings. In order to support these efforts, Chatbots can be used to assist buying centers along the purchase decision process. However, B2B Chatbots have so far only been marginally addressed in the scientific human-computer interaction and information systems literature. To provide both researchers and practitioners with knowledge about the characteristics and archetypal patterns of Chatbots currently existing in B2B customer services, we develop and discuss a 17-dimensional chatbot taxonomy for B2B customer services based on Nickerson et al. (2013). By classifying 40 Chatbots in a cluster analysis, this study has identified three archetypal structures prevailing in B2B customer service chatbot usage.

Keywords:

Chatbot Taxonomy, Business-to-Business, Customer Services

I - The Role of User Involvement

Appendix I

The Role of User Involvement:

Relationship between Participatory Design and Design Science Research

Davinia Rodríguez Cardona, Antje Janssen, and Michael H. Breitner

Citation:

Rodríguez Cardona, D., Janssen, A., & Breitner, M. H. (2021). The Role of User Involvement: Relationship between Participatory Design and Design Science Research. In: IWI Discussion Paper Series (#97). ISSN: 1612-3646.

Repository URL:

https://www.iwi.uni-hannover.de/fileadmin/iwi/Publikationen/DP/IWI_DP97_k.pdf

Abstract:

An important factor for the success of design oriented processes is the involvement of the future users. However, there is a dispersed knowledge about how Participatory Design can be used in connection with Design Science Research to assess user preferences. Aiming to synthesize the existent knowledge on these both design oriented approaches , this IWI discussion paper provides an overview of the relationship, similarities and differences on diverse Participatory Design methods used in the extant scientific literature either separately or embedded in Design Science Research processes.

Keywords:

Design Science Research, Participatory Design, User Involvement, Research Design, Research Method

J - User-Chatbot Relationships with Different Time Horizons

Appendix J

See You Soon Again, Chatbot? A Design Taxonomy to Characterize User-Chatbot Relationships with Different Time Horizons

Marcia Katharina Nißen, Driton Selimi, Antje Janssen, Davinia Rodríguez Cardona, Michael H. Breitner, Tobias Kowatsch, and Florian von Wangenheim

Citation:

Nißen, M.K., Selimi, D., Janssen, A., Rodríguez Cardona, D., Breitner, M.H., Kowatsch, T., & von Wangenheim, F. (2022): See You Soon Again, Chatbot? A Design Taxonomy to Characterize User-Chatbot Relationships with Different Time Horizons. Computers in Human Behavior, 127, 107043.

Repository URL:

https://dl.acm.org/doi/abs/10.1016/j.chb.2021.107043

Abstract:

Users interact with Chatbots for various purposes and motivations – and for different periods of time. However, since Chatbots are considered social actors and given that time is an essential component of social interactions, the question arises as to how Chatbots need to be designed depending on whether they aim to help individuals achieve short-, medium- or long-term goals. Following a taxonomy development approach, we compile 22 empirically and conceptually grounded design dimensions contingent on Chatbots' temporal profiles. Based upon the classification and analysis of 120 Chatbots therein, we abstract three time-dependent chatbot design archetypes: Ad-hoc Supporters, Temporary Assistants, and Persistent Companions. While the taxonomy serves as a blueprint for chatbot researchers and designers developing and evaluating Chatbots in general, our archetypes also offer practitioners and academics alike a shared understanding and naming convention to study and design Chatbots with different temporal profiles.

Keywords:

Conversational Agents, Chatbots, Temporal Profile, Time-Dependent Design, Taxonomy, Archetypes

K - Influences of Digital Innovations on Advisory Work

Appendix K

Influences of Digital Innovations on Advisory Work in the Financial Services Sector

Theresa Eden, Oliver Werth, Davinia Rodríguez Cardona, Christoph Schwarzbach, Michael H. Breitner, Johann-Matthias Graf von der Schulenburg

Citation:

Eden, T., Werth, O., Rodríguez Cardona, D., Schwarzbach, C., Breitner, M. H., & Graf von der Schulenburg, J.-M. (2022). Influences of Digital Innovations on Advisory Work in the Financial Services Sector. Die Unternehmung: Swiss journal of business research and practice, 76(1), 6– 27.

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Abstract:

We explore the background, changes, and challenges of the digital transformation of customer advisory in the financial services sector resulting from the implementation of new technological solutions. In addition, we examine the effects of the adoption of digital innovations on advisory work. Building on insights drawn from a multiple case analysis within two financial services providers and using the Technology-Organization-Environment (TOE) framework as the theoretical basis, our study identifies 13 factors that influence advisory work when technological innovations are introduced. We provide implications for financial services providers with regard to the identified influencing factors. Our results and findings expand the academic knowledge and understanding of the chances and challenges in the context of introducing technological innovations for financial advisory. Practitioners can use our insights for future implementations of technical solutions for advisory work.

Keywords:

Digital Innovations, Financial Advisory, Financial Services Sector, TOE Framework, Case Studies, Qualitative Research

L - Taxonomy-Based Analysis of FinTech Success Factors

Appendix L

What Determines FinTech Success? – A Taxonomy-Based Analysis of FinTech Success Factors

Oliver Werth, Davinia Rodríguez Cardona, Albert Torno, Michael H. Breitner, Jan Muntermann

Citation:

Werth, O., Rodriguez Cardona, D., Torno, A. Breitner, M. H., & Muntermann J. (2023). What Determines FinTech Success? – A Taxonomy-Based Analysis of FinTech Success Factors. Electronic Markets, 33, Article 21.

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Abstract:

Value creation in the financial services sector has been fundamentally transformed by digitally born financial technology (FinTech) companies. FinTech companies synthesize information systems with financial services. Given its disruptive power, the FinTech phenomenon has received great attention in academic research, practice, and media. Still, limited systematic research provides a structure and holistic view of FinTechs' success. Aiming to enhance understanding of the factors enabling FinTech success, we classify success factors across extant scientific literature on distinct FinTech business model archetypes. Our analysis reveals that the "cost–benefit dynamic of the innovation," "technology adoption," "security, privacy, and transparency," "user trust," "user-perceived quality," and "industry rivalry" are crucial factors for FinTech success and can be seen as "grand challenges" for the FinTech ecosystem. In addition, we validate and discuss our findings with real-world examples from the FinTech industry and two interviews with stakeholders from the FinTech ecosystem. Our study contributes to the knowledge of FinTechs by providing a classification system of success factors for practitioners and researchers.

Keywords:

FinTech Success Factors, Taxonomy-Based Analysis, FinTech Business Models

M - User-Oriented Implementation of Chatbots

Appendix M

How to Make Chatbots Productive – A User-Oriented Implementation Framework

Antje Janssen, Davinia Rodríguez Cardona, Jens Passlick, Michael H. Breitner

Citation:

Janssen, A., Rodríguez Cardona, D., Passlick, J., & Breitner, M. H. (2022). How to Make Chatbots Productive – A User-Oriented Implementation Framework. International Journal of Human-Computer Studies, 168, Article 102921.

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Abstract:

Many organizations are pursuing the implementation of chatbots to enable automation of service processes. However, previous research has highlighted the existence of practical setbacks in the implementation of chatbots in corporate environments. To gain practical insights on the issues related to the implementation processes from several perspectives and stages of deployment, we conducted semi-structured interviews with developers and experts of chatbot development. Using qualitative content analysis and based on a review of literature on human computer interaction (HCI), information systems (IS), and chatbots, we present an implementation framework that supports the successful deployment of chatbots and discuss the implementation of chatbots through a user-oriented lens. The proposed framework contains 101 guiding questions to support chatbot implementation in an eight-step process. The questions are structured according to the people, activity, context, and technology (PACT) framework. The adapted PACT framework is evaluated through expert interviews and a focus group discussion (FGD) and is further applied in a case study. The framework can be seen as a bridge between science and practice that serves as a notional structure for practitioners to introduce a chatbot in a structured and user-oriented manner.

Keywords:

PACT Framework, Chatbot Implementation Framework, Human Computer Interaction, Human-Centered Design